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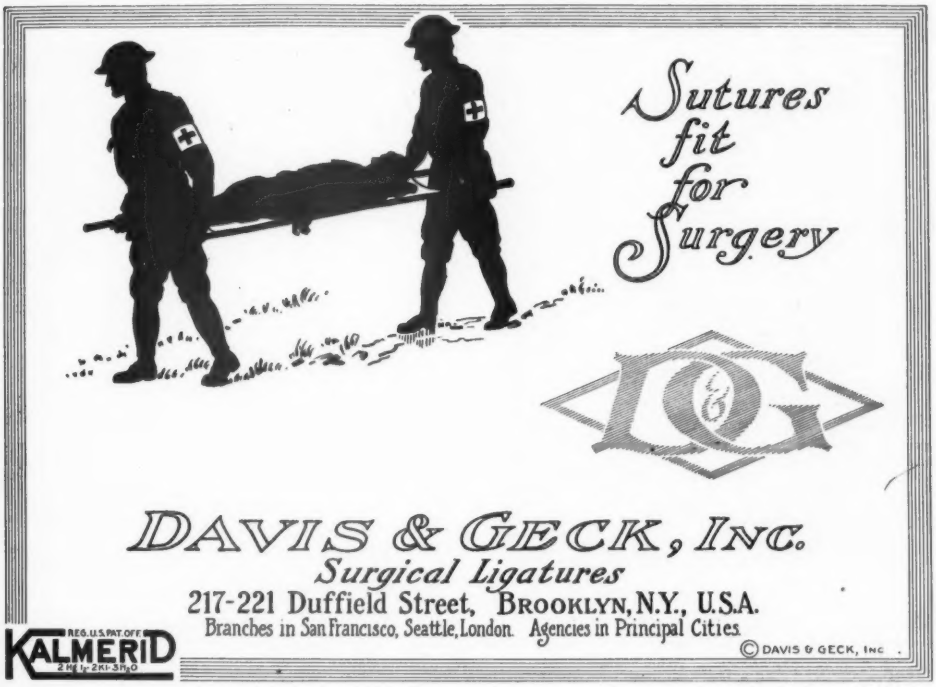

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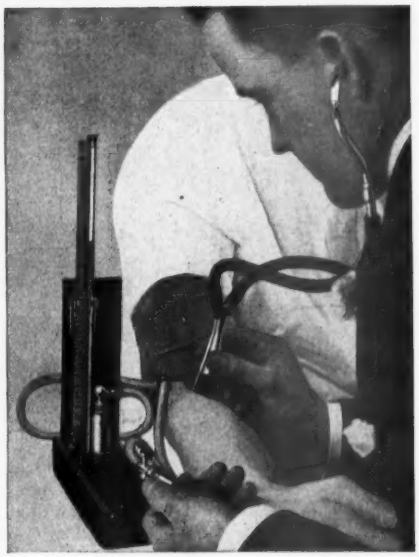

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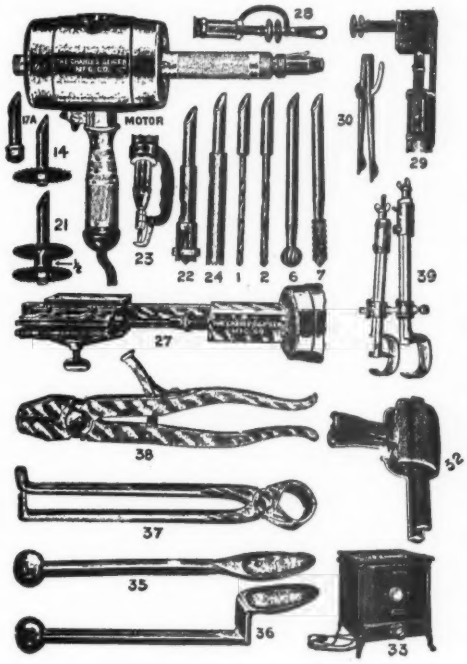

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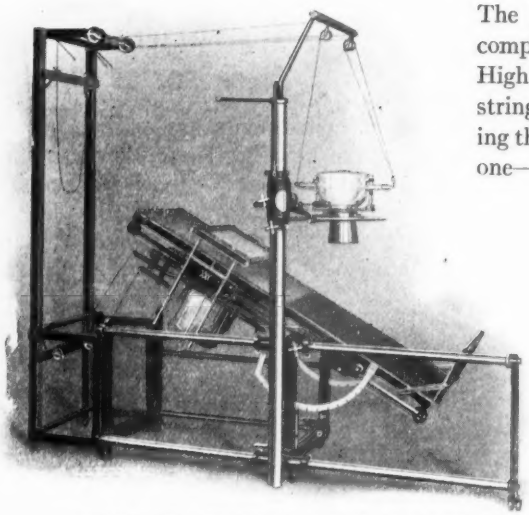

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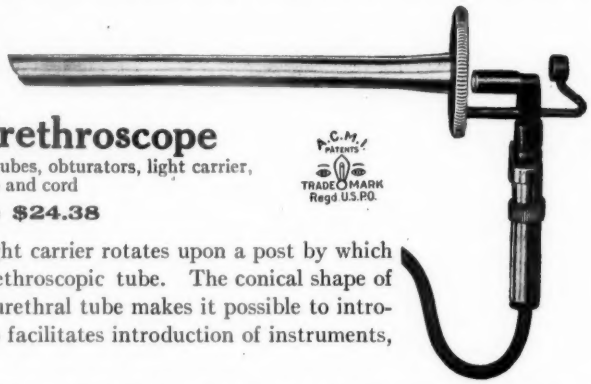

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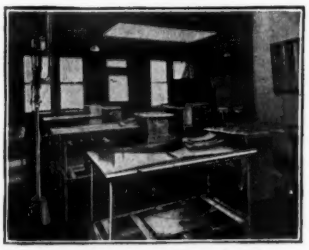

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VOLUME XXVII AUGUST, 1918 NUMBER 2

EXPERIENCE WITH FOERSTER'S OPERATION FOR GASTRIC CRISES AND SPASTIC PARALYSIS

BY K. KAWAMURA, M.D., AND T. KIMURA, M.D., KYOTO, JAPAN
From the Surgical Department of the Prefectural Medical College of Kyoto, Japan

BY Foerster's operation we mean the intradural resection of the posterior spinal nerve-roots. Although a similar operation was performed for the relief of neuralgia of the brachial plexus by Abbé in 1888, and also by Bennet about the same time, rhizotomy for the relief of gastric crises and spastic paralysis was first proposed by Foerster and was successfully carried out by Kuettner in 1908. Since that time the operation has been done frequently and has received the cordial approval of many surgeons, while others have doubted its real value. For instance, Gaugle and Guembel will no longer perform Foerster's operation for Little's disease. Some authors have also found that pain recurs after the rhizotomy for gastric crises, so that the nature of the crises has been presumed to be entirely peripheric. These authors claim that relief may be obtained by the extension of celiac plexus. Accordingly it will not be superfluous if we report our recent experience with two cases of the operation and state what we have found to be indications for and results of rhizotomy.

GASTRIC CRISES

Gastric crises, as is well known, appear in the earliest stage of tabes dorsalis and is one of its most painful symptoms. Clinically it is indicated by severe pain and vomiting. The pain comes on suddenly and reaches the height of its severity in an instant. The patient becomes pale, writhes with pain, and often falls in collapse, the rapidity of his pulse increasing greatly. The attacks are recurrent, and in the meanwhile, the patient becomes emaciated and resorts to the use of morphine. Some even attempt suicide. Hence, numerous therapeutic measures have been offered, such as medical and electrical treatments, epidural and subdural injections of fibrolysine, hydrargyrum bijodatum, cocaine, stovaine, and tropacocaine. However, if any benefit at all is derived from these drugs it is only temporary.

As stated above, Foerster was the first to propose resecting the posterior dorsal roots for intractable pain in visceral crises. According to Foerster the primary symptom of the gastric crises is due to an irritation of the sensory sympathetic fibers of the stomach which, after entering the splanchnic major nerve, pass by rami communicantes to the spinal cord through the seventh, eighth, and ninth thoracic nerve-roots. By the resection of these roots, the reflex bow which leads to very painful vomiting is interrupted and the attack of severe pain may be removed. According to our investigation, 49 cases of similar operation have hitherto been reported since the publication of his successful case.

The following case of gastric crises came under our care:

CASE 1. Male, laborer, 30.

History. Hereditary tendency negative. About eleven years ago, the patient suffered from chancre and bubo. For some five years he has complained of acetous eructation, pyrosis, severe pain in the stomach, and vomiting. These phenomena had no relation to meals; their frequency and force were variable. In a mild attack sometimes, the pain passed away after a few minutes, but at other times obstinate vomiting and severe pain were experienced. The attacks were repeated at least three to eight times daily. In some years an attack continued from fifteen to twenty days, in consequence of which absorption of food was made absolutely impossible and the patient became thinner and thinner. Once an intravenous injection of salvarsan was given; but without effect. No benefit was derived from any treatment. The symptoms became worse and worse, and the patient became addicted to the use of morphine. Moreover, he complained for several years of incontinence of urine and swelling of the left knee-joint.

The patient was admitted to our clinic, October 11, 1916.

Examination. The patient was of medium size, in poor general condition, and excessively emaciated. Although the sense of smell failed him, the sense of hearing was normal. No difference existed in the size of the two pupils, but the pupillary reflex to light was absent. The lungs and the heart were normal. No paræsthesia of the skin of the upper abdomen nor any increase of the abdominal reflex were indicated. In the inner side of the left leg the sense of touch had weakened to some extent. The skin of the lower extremity was strongly hypersensitive to cold and heat. The patellar and Achilles tendon reflexes were absent on both sides. A hyperextension of the left knee (genu recurvatum) was remarkable. The joint was greatly swollen, the circumference of which was 54 centimeters, whereas that of the right was 31 centimeters. No pain was felt in moving, and there was hypermobility in all directions. The X-ray examination showed productive and destructive processes of the articular ends of femur and tibia, hypertrophy of patella, and two loose bodies each being the size of a hen's egg near the inner and outer epicondyles of the femur. The body swayed when the eyes were closed. The examination of gastric juice showed the following results: in the first extraction, a total acidity of 22, disappearance of free hydrochloric acid, and lactic acid positive; in the second extraction, a total acidity of 52, free hydrochloric acid 44, and lactic acid positive. It was easy to understand that the patient was suffering from tabetic gastric crises, though the Wassermann reaction was negative.

Diagnosis. Tabetic gastric crises and Charcot's disease.

Because different medical and specific treatments were unsuccessful, we decided to do a Foerster operation before the patient's life was endangered from excessive denutrition.

Operation, October 26, 1916. A hypodermic injection of pantopon was given one hour before the beginning of the operation, and the operation was performed under the influence of ether and chloroform. The patient was placed in the left lateral position. First a mark was made on the skin at the height of the spinous process of the fifth thoracic and a slight incision was then made perpendicular to the vertebra. A longitudinal incision about 20 centimeters long was made beginning from the point and extending to the spinous process of the tenth thoracic, through the skin over the spinous processes. The muscle and periosteum were loosened partly by sharp, partly by dull dissection. After denudation of the thoracic, the laminæ and spinous processes of the sixth to tenth dorsal vertebræ were removed. As the dura and arachnoidea were opened between two small tissue forceps, about 30 cubic centimeters of cerebrospinal fluid flowed out. The sixth to tenth posterior dorsal roots were isolated from a small vessel which accompanied the nerve-root and were resected on both sides for 0.7 to 1 centimeter. The blood-clot was wiped off, and the dura was closed, with a continuous very fine silk thread suture. The muscles were sutured, infolding them as in a Lembert intestinal suture. Then the suture was passed through the fascia and lastly through the skin, and the wound was closed completely without application of either tampon or drainage. At the end of the operation, 700 cubic centimeters of physiological salt solution were injected hypodermatically.

October 27. The patient's condition was perfectly satisfactory. He was entirely exempt from gastric pain and vomiting. He complained only of a hypodermic pain in the left iliac region and a lessened sensibility of the hypogastric region.

October 28. The pain of the iliac region was lessened, but there was retention of urine. The temperature rose to 38°c.

October 29. The temperature returned to normal, but the retention of urine was unchanged.

November 2. Sutures of the skin were removed. The wound had healed completely.

November 11. The patient regained vesical control. The dribbling from which he had suffered before the operation was cured. For the first time he sat up on the bed.

December 12. From the nipple to the level of the navel in the circumference of the thorax, sense of touch, of pain, and of temperature was dull in comparison with the surface of normal skin.

December 15. The region of sensory paralysis was somewhat diminished.

December 20, 1917. The patient has been in good health with no return of gastric pain and vomiting during the one year which has elapsed since the operation.

LITTLE'S DISEASE

Besides the medical treatment there are many surgical procedures for the relief of spastic paralysis. For example, multiple

tenotomies, and also excision of portions of the contracted muscles, have sometimes given good results if followed by careful instruction and the use of retentive apparatus. But for the extreme cases surgical intervention does not prove sufficiently effective.

Foerster first suggested intradural resection of the posterior sacrolumbar nerve-roots for spastic paralysis. In his opinion, this paralysis consists of a disease of the corticospinal nerve tract and in men it consists essentially of that of pyramidal tract. The motor disturbance which is attributed to this nerve tract is composed of two different components, namely, paretic and spastic. The paretic component springs from the interruption of the innervated pyramidal tract fiber, and according as the whole or a part of the innervated fiber is destroyed, corticous voluntary irritability of individual groups of muscles is either suspended or weakened. The spastic component consists of the increase of reflex irritability of muscles from periphery. The spastic symptoms arise because the sensory irritations which continue to pour in toward the gray matter of the spinal cord are no longer weakened or destroyed by inhibitory fiber, but flow unimpaired into muscles. But if a lesion of the corticospinal tract, namely, a disease of lateral column of the spinal cord with spastic paralysis of the leg, is added to a lesion of the path for the conducting of sensory irritation flowing into the lumbar portion of the spinal cord, that is a lesion of the zone of entry of the roots of posterior column of lumbosacral cord, then spastic symptoms will disappear. Thus, he has proposed that the severe spastic paralysis of the leg may be cured with the resection of the lumbosacral roots.

CASE 2. A peasant boy, age 6.

History. The father died from cancer of the stomach; the brothers and sisters of the boy are sound. He was born in the eighth month as one of twins. From birth the child has been very infirm. Three years ago his mother noticed that he kept the knees flexed and crossed. From the very first he has never been able to stand or walk.

Examination. The child was small in stature and frail in frame. He had squint eyes. The expression of the countenance was idiotic; as a matter of fact he was imbecile. The lungs, the heart, and the upper limbs were normal. Both legs were held in adduction and internal rotation so that the lower extremities showed the typical crossed leg progression, each leg being thrown across the other. Both hips and knees were kept flexed. The feet always pointed inward, the right being more extreme than the left (Fig. 1). All active and passive movements were exceedingly restricted. Independent movement of each leg or a part of it was impossible. When we tried to move one of the legs, the movement of the other followed involuntarily. The passive movements of hip, knee, and ankle-joints provoked a strong resistance, which was particularly strong in the ankle-joints. The reflexes were exaggerated. Ankle clonus and Babinski's sign were present. He had never been able to walk or even to sit up.

Fig. 1 (at left). Case 2 before operation.
Fig. 2. Same case after operation.

Operation March 17, 1917. The patient was placed in the left lateral position, with the pelvis slightly elevated. The operation was performed under the influence of ether. A vertical incision, 15 centimeters long, was made through the middle of the back extending from the spinous process of the eleventh thoracic to the upper tip of the sacrum. By the same manipulation, as mentioned above, the skin, the subcutaneous tissue, the muscles and the periosteum were separated. When the spinous processes and the laminæ from the first to fifth lumbar vertebræ were removed with a bone forceps and the spinal canal was opened, about 30 cubic centimeters of the cerebrospinal fluid flowed. The second, third, fifth lumbar and second sacral sensory roots from each side and also the first sacral nerve-root from the right, were chosen for resection. They were isolated with a blunt hook, and at least 1 centimeter of each was resected, of course care being taken to avoid cutting small vessels which surround the nerve-root. The dura was closed by a continuous suture of very fine silk, drawn closely together. The muscles with fascia were sutured infolding, and

the skin was treated as usual. Neither tampon nor drainage was applied. The patient's condition at the end of the operation was perfectly satisfactory.

On the following day, the lower limbs were absolutely relaxed.

March 23. Healing by first intention took place.

March 24. Passive movement, massage and bath were begun.

March 29. Both legs were fully straightened out at the hips and knees, and were bent at a right angle at the ankle-joints. The lower limbs were abducted and rotated outward, and in this position a plaster-of-Paris bandage was applied.

April 24. The plaster was removed and electrotherapy was commenced.

May 19. Subcutaneous tenotomy of the left adductors was performed, because the adductor spasm appeared more clearly on the left side compared with the right.

May 31. Babinski's sign and Achilles jerk disappeared, but on the left side the ankle clonus was still present.

June 29. The patient was able to get up with the help of the upper limbs.

August 24. The patient was discharged. His condition at that time was as follows: Neither rectal nor urinary disturbance was present. No disorder in the sense of touch was noticed. Patellar reflex on both sides was normal. The ankle clonus was absent from the right side but there was a weak trace of it in the left. Babinski's sign and Achilles jerk were negative. It was possible for him to stand erect, and to take a few steps with the aid of crutches (Fig. 2). Independent active movements of the lower limbs or a part of them were possible. At the time of passive movements no resistance was present.

Now we desire to summarize briefly the chief points in the technique and the results of the operation, which we think deserve mention.

The lateral position, with the patient on the left side, has been found to be very satisfactory. In the prone position calm respiratory movements are disturbed. For example, in a case reported by Kuettner respiration ceased in consequence of this position, and the patient was turned over upon his back to produce artificial respiration. The patient died later from meningitis owing to entrance of bacteria into the wound. It is well in the operation for gastric crises to place the patient in a strictly horizontal position with the head bent forward as much as possible. If the head of the patient is elevated, a large quantity of cerebrospinal fluid flows out during an incision of the dura causing anxiety lest a critical condition, or collapse, etc., similar to that reported in a case of Hildebrand, should occur. On the other hand, in the elevated position of the pelvis, though the outflow of fluid is small in quantity, dryness of the spinal cord below the field of operation may occur. Consequently, some weakness, pain, or paralysis of the leg may be produced after the operation, as was experienced by Heile, Becker, Bierend de Hann. In Little's disease it is more effective to lower the head of the bed slightly.

That the outflow of a large quantity of cerebrospinal fluid during the operation is disastrous to the patient is recognized by many surgeons. For example, in Lotheissen's case the pulse became extremely weak due to the loss of fluid and even during the operation subcutaneous injection of salt solution was found necessary. It is very difficult to determine how much cerebrospinal fluid may be lost without having any influence upon the patient, but according to our own experience, the loss of about 30 cubic centimeters of the fluid produces no bad results. Therefore, it is not necessary to perform extradural resection of the posterior roots, as was attempted by Guleke.

The operation has been performed by some surgeons in one stage, and by others in two stages: first, the removal of the spinous processes with the laminæ, and after a few days the opening of the dura with resection of the posterior roots. Which is to be preferred? Tietze has performed in two stages a similar operation upon five cases suffering from gastric crises and neuralgia, and he claims that its strong points are: There is clear vision of the field of operation as there is no excessive hæmorrhage at the time of the opening of the dura and therefore there is no necessity of wiping frequently, and there is no injury to the nerve-roots. Others believe that it minimizes shock, which is supposed to be especially great in this operation. According to our own experience, however, the shock and the bleeding are not so great as they were formerly supposed to be. Besides, in the two-stage operation the danger of wound infection, is increased and the risk due to the anæsthetic is doubled. Therefore, we

do not advocate the performing of the operation in two stages. We believe that it is better to perform the whole operation in one stage except when the condition of the patient is such as not to allow an operation extending over so many hours.

In regard to the suture of the wound, many surgeons employ the interrupted suture using fine catgut or silkworm-gut for closing the dura. We have applied a continuous suture with very fine silkworm-gut instead and have thus prevented the leakage of cerebrospinal fluid. For the elimination of the dead space, which is formed by the resection of spinous processes and laminæ, we have sutured, infolding the muscles as is done in the Lembert intestinal suture. After closing the wound completely, the patient is placed in the dorsal position. Because the dead space is very large, it seems that the application of a tampon or drainage is necessary. But the danger of introducing bacteria is not only much increased, but the cerebrospinal fluid sometimes flows out after their removal. Floercken reports a case in which he applied a comparatively close suture on the dura, but after the removal of the drain, a large quantity of fluid accumulated under the wound already cured. Lotheissen says that in his first case he inserted iodoform gauze in the wound for the arrest of hæmorrhage, and saw an outflow of cerebrospinal fluid at the time of its removal a few days later. Three days after that, the patient suddenly suffered with a high fever and his consciousness was disturbed. Hildebrand and Tietze have described a similar experience. Being warned by these cases, we have sutured the wound with no drain and have obtained good results.

In Foerster's operation, the spinal roots should be resected, for cutting them is not sufficient. If they are not resected, there is anxiety for fear that a relapse may occur. Chipault has estimated that 1 centimeter at the cervical segment, 2 centimeters at the dorsal part, and 3 centimeters at the lumbar region can be resected. We resected in our first case 0.7 to 1 centimeter from each posterior root and at least 1 centimeter in the second case. Although Guleke finds no necessity for resection of posterior nerve-roots, we can not entirely approve of that method. This opinion seems to be substantiated by Abbé's case of neuralgia of the brachial plexus, in which a relapse occurred after cutting the posterior roots, but when the roots were resected, it brought a happy result.

How many nerve-roots are to be cut? At first Foerster suggested cutting from the seventh to the ninth dorsal roots in a case of gastric crises, but in a further report he recommends that five, six, or even seven roots be cut, as the sympathetic nerve fibers originating in the stomach and intestines reach from the sixth to the twelfth. The resection is generally performed from the seventh to the tenth dorsal roots and occasionally from the seventh to the ninth, and still less frequently in other cases. In our first case we chose to resect from the sixth to the tenth roots. In Little's disease Kotzenberg resected from each side the third and fifth lumbar and the first sacral roots in a case of extreme spasm and marked paralysis and obtained complete success. In accordance with the proposition of Foerster, we have resected more extensively, selecting the second, third, fifth lumbar and the second sacral roots on both sides and also the first sacral root on the right. In spite of this, however, there was a slight resistance when the left leg was moved passively. In view of these facts, it seems to be advisable in a case of an extreme spastic condition of Little's disease to excise at least four roots on each side.

Because the patient with gastric crises is, generally speaking, debilitated from the disease and the use of morphine, the degree of danger of a Foerster operation, is often far greater than would be the case in doing the same operation for Little's disease or neuralgia. According to the statistics of Lotheissen, 29 cases of different forms of neuralgia have been operated on and of these the results were not good in 6. However if we subtract 3 cases, which died from causes not due to the operation, the mortality is 10.3 per cent. On the other hand if the 3 cases, which died of tuberculosis or other unknown causes, are substracted from the 29 cases operated upon for gastric crises, there are 9 cases or 23 per cent in which death in attributed to the operation. If we

deduct the cases of pneumonia and pulmonary embolism, which may follow operations for other diseases, the percentage will become 17.9 per cent. From the time of Lotheissen's report up to the present, 11 cases of a similar operation have been published including our first case. Of these eleven cases, none died as the result of the operation, and if we add the above number to the statistics of Lotheissen, the mortality for the operation of gastric crises is barely 14 per cent. Under these circumstances, the danger is by no means startling.

On the whole Foerster's operation is so successful that it has been repeated with satisfactory results a number of times since. The results immediately after the operation are especially remarkable. Kuettner's first patient suffering with gastric crises ordered his own meals from the day following the operation and his weight increased 2 kilograms during the first week. A patient of Bruns and Sauerbruch gained 22.5 kilograms in weight within six weeks. In our first case, vomiting and pain stopped entirely from the day following the operation and with a normal appetite of a healthy person, the patient gained in weight daily. The results of our second case were also successful. A boy, who could not stand up at all before the operation, walked fairly well with crutches and especially well when led by the hand. But at times after the rhizotomy, paraplegia occurred, which later disappeared partially although not completely. As its causes, the following technical failures are enumerated: harsh treatment of the spinal cord, injury of small arteries resulting in hæmorrhage into dural sac and disturbance of nutrition of the cord, excessive desiccation of the cord on account of a long-continued depression of the head with elevated pelvis.

Therefore, if we are to give a final decision as to the results of the operation, it is necessary to observe the patient for a long time afterward. In Little's disease, the after-treatment of the patient is of supreme importance. The use of the plaster-of-Paris bandage, with its covering easily removable, suitable exercise, massage, electrotherapy, etc., should be continued for sometime.

ŒSOPHAGEAL DIVERTICULA[1]

By E. S. JUDD, M.D., F.A.C.S., Rochester, Minnesota

DILATATIONS of the entire œsophagus are usually produced by spasmodic contractions at the lower end, while dilatations involving only a segment of the organ are either congenital or situated above a stricture. These dilatations differ entirely from diverticula in that the former involve all of the structures of the œsophagus, while the diverticula are in reality only hernias involving the mucous membrane and submucosa which project through the muscular coats.

The diverticula are divided into two types: traction and pressure diverticula. In traction diverticula the distortion is usually due to a pulling force acting from outside the œsophagus, and generally occurs at the point where the œsophagus crosses the left bronchus. It is most often due to the contraction of a cicatrix formed by the healing of a suppurating lymph gland. Diseases in the pleura or lung, adhesions to the thyroid, when there is a marked cystic degeneration, mediastinitis, and caries of the vertebræ, have all been cited as etiologic factors in producing this form of diverticulum. It has also been noted that these diverticula are often multiple. In 1900, Brosch called attention to the cavum broncho-aorticum, stating that the aorta, bending to the left and backward, crosses the œsophagus on its left side, forming between the aorta and the left bronchus this narrow space where the œsophagus is not in contact with any firm structure as is the case in other regions. As food passing down the œsophagus is presumably under more or less pressure from the surrounding firm structures, there is an opportunity for pouching on its arrival at this point where outside pressure is lacking and internal pressure predominates. LeCount has observed three of these diverticula which were unattached either to lymph nodes or to any surrounding structure. As no microscopic examinations were made of the sacs in these cases it is uncertain how many of the œsophageal coats were involved. According to the location, size, and other characteristics, these cases might have been classified as traction diverticula but for the fact that there was no pulling from the outside.

Traction diverticula usually produce no symptoms and are of no surgical importance. It is said that the apex of the diverticulum is usually higher than the base so that no food or mucus can accumulate in it. However, in some cases the apex has been low enough to allow an accumulation of food particles, and these cases are known as traction-pulsion diverticula which sometimes attain to considerable size. Even then they seldom present symptoms. We have seen one case in which there was a fairly large sac at the lower end of the œsophagus which apparently produced few if any symptoms (Fig. 14, Case 197786).

The findings were as follows:

Case 197786, W. T. W., a male, aged 42 years, consulted us July 14, 1917, at which time he gave a history of stomach trouble of twenty years' duration. He complained chiefly of a feeling of fullness coming on in spells, periodically. There had been no regurgitation of food or sense of obstruction during this period. He had been treated elsewhere for stomach trouble for fifteen years. Five years previously he had vomited a large quantity of dark blood and since that time there had been considerable regurgitation of acid food and mucus. His condition gradually grew worse up to the time of our examination. Two years previous to this he had had an X-ray examination of the œsophagus and stomach elsewhere, with a negative diagnosis; at this time he had had two nocturnal attacks of epilepsy, and later, two other attacks. Physical examination showed a fairly well nourished man weighing 183 pounds. The Wassermann test was negative. The X-ray examination of the stomach was negative, but revealed a diverticulum of the lower third of the œsophagus, which confirmed the opinion that had been given.

Tetens found that of 80 traction diverticula, 6 had assumed the characteristics of the traction-pressure variety from the accumulation of food and inside pressure.

The pulsion or pressure diverticulum is a particularly interesting condition and the treatment shows marked development in this kind of surgery in a comparatively few

[1] Presented before the Minnesota Academy of Medicine, St. Paul, February 13, 1918.

years. Zenker and Ziemssen, in 1877, described such diverticula, and their description of the occurrence and pathology is the basis for all of our present knowledge concerning them. They stated that radical cure of a diverticulum of the œsophagus by operative procedure from without was one of our vain wishes but they hoped that even this operation might at some future day be performed safely. At the present time this condition can be readily and accurately diagnosed and is amenable to surgical treatment. Such diverticula are always located in the cervical region in the unsupported œsophageal wall at a point directly opposite the cricoid cartilage. This is a weak point in the arrangement of the musculature at the juncture of the pharynx with the œsophagus, and is sometimes spoken of as the pharyngeal dimple. There is a physiologic narrowing at the level of the constrictor muscle, and a hiatus exists in the longitudinal muscle. In all of our cases this opening has been posterior and the sac has usually presented itself to the left side. Just what the etiologic factor in these pressure diverticula is has never been definitely shown, but it has been shown that the pressure in the œsophagus is greatly increased during deglutition. Hirsch has demonstrated that deglutition is bucco-pharyngeal and œsophageal, and that foods are carried down the œsophagus by peristaltic contractions. He has also demonstrated that it is necessary for the upper orifice to be closed in order to allow the contents of the œsophagus to enter the stomach; otherwise there is regurgitation. It is very likely that this pressure is greater if the food is not properly masticated and is swallowed too rapidly. It is quite possible that any unusual increase in pressure may account for the formation of some diverticula.

About 150 pressure diverticula have been reported in the literature. Several years ago Stetton collected 60 cases in which operation had been done, with a mortality of 16.6 per cent. There are thirty-five cases in the series discussed in this paper.

The first symptoms of this condition are usually dryness in the throat and a scratchy feeling as though there were a small foreign body present. These sensations make it difficult for the person to swallow. Nausea follows, mucus is raised from the throat and later particles of undigested food are brought up. Difficulty in swallowing was noted in all of our cases, while 30 out of the 35 patients complained of regurgitation of food. A gurgling noise in the throat, which is often mentioned, was present in 12 of the cases. A feeling of pressure, symptoms of stricture, and choking sensations develop. The symptoms of an œsophageal diverticulum rarely present themselves before patients are 45 years of age. The average age in our 35 patients when they came for treatment was 54 years; the average duration of symptoms was 5½ years. A visible or palpable tumor of the neck occurs only when the sac is large, and in the cases formerly reported this occurred in about 30 per cent. Ten of the patients of our series had a visible or palpable tumor in the neck. In 7 cases the tumor was on the left, in 3 on the right side. The weight loss is great in case the sac is large or so shaped as to close off the lumen of the œsophagus. In some of the cases the obstruction was almost complete. The average loss of weight in the entire series was 27 pounds, the highest being 65 pounds. In 8 cases in which the diverticulum was small there was no loss in weight. Some of these patients learn to feed themselves with a stomach tube when the swallowing becomes too difficult. In some of the extremely emaciated patients it seemed best to perform a gastrostomy before attempting any treatment of the diverticulum, although feeding can usually be kept up with a small tube. I think preliminary gastrostomy is seldom, if ever, necessary.

The size of the sac of the diverticulum varies greatly. The opening into the œsophagus may be small, producing a typical saccular diverticulum, but in some of our cases the opening was as large as the lumen of the œsophagus. It is well to bear in mind that in a certain number of these cases the opening of the diverticulum is large, because in removing them too much of the wall of the œsophagus itself may be removed (Figs. 1-12).

The diagnosis can practically always be made by means of an X-ray picture, taken after swallowing a bismuth mixture. The X-ray and the œsophagoscope make the

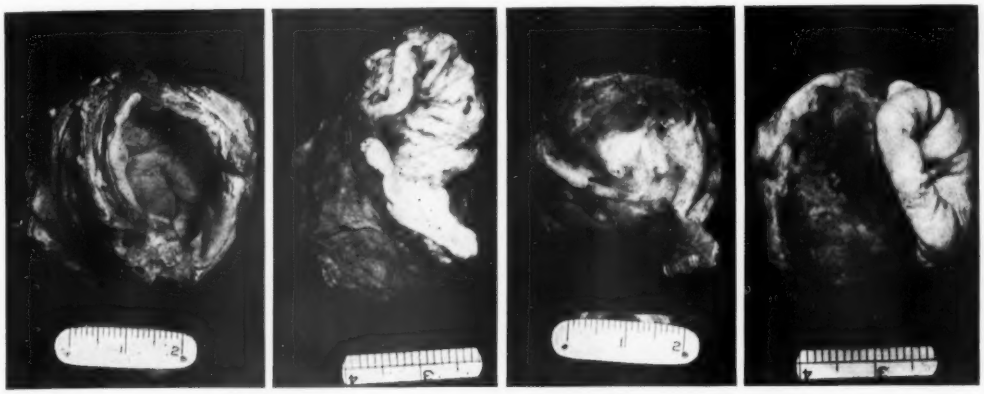

Fig. 1 (116523). Fig. 2 (194431). Fig. 3 (91276). Fig. 4 (183605).

Photographs of diverticula showing the character of the walls.

diagnosis certain. The history nearly always gives a good clue to the diagnosis, and this, together with a physical examination and the presence of the characteristic swelling in the neck, is sufficient. Before the use of the modern methods of examination many of these cases were diagnosed as cardiospasm, œsophageal stricture, and carcinoma. In many instances gastrostomy has been performed for œsophageal diverticulum on the assumption that the obstruction was caused by malignancy.

The treatment of œsophageal diverticula is surgical and should be made as conservative as possible. It consists in either obliterating or removing the sac, several different methods having been devised for this purpose. In the extreme cases, it is always necessary to put the patients into as good general condition as possible before attempting any treatment for the diverticula. Instead of performing a preliminary gastrostomy, as has been suggested in the emaciated and starved cases, the same object can often be accomplished by rectal feeding, subcutaneous salines and feeding with a stomach tube when that is possible. The majority of our patients came for treatment in a sufficiently satisfactory general condition to warrant doing the operation on the diverticulum without any preliminary measures.

When the diverticulum is small and has a large opening communicating with the œsophagus, dilatation with large sounds will, in some instances, relieve all the symptoms, while in others this method of treatment may be preferable to the more radical excision, especially if there is any contra-indication to the open operation. Mixter has satisfactorily treated a number of patients in this way; however, it might be necessary to repeat this treatment from time to time.

Bevan recently described a method of infolding the diverticulum by means of a series

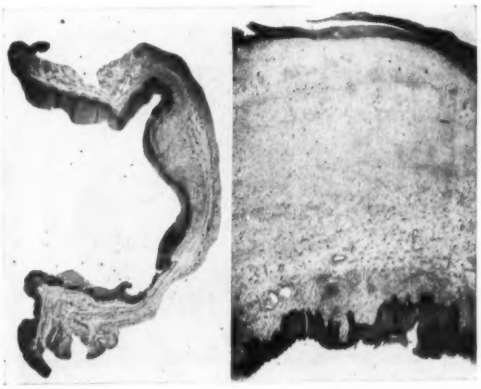

Fig. 5 (65020) (at left). Low power photomicrograph of cross sections, showing the walls of the diverticula made up of mucous membrane and submucosa.

Fig. 6 (206243). High power of cross section of a diverticulum. (See Fig. 5.)

Fig. 7 (23253).

Fig. 8 (23253).

X-ray photographs of small œsophageal diverticula.

of purse-string sutures, reporting a number of cases in which the results were very satisfactory. By this method the sac itself is not removed but is gradually folded up and turned into the lumen of the œsophagus, where it either atrophies or is cast off. Girard has cured two patients by this method. This operation has the great advantage of eliminating every possibility of infection, as the mucous membrane is not opened. As the sac is composed only of mucous membrane and submucosa, the operation is usually easily performed. The element of infection is very important in these cases, and when the œsophagus is opened it is sometimes difficult to prevent a small amount of soiling. The tissues of the œsophagus tear very easily and even if the sutures are accurately placed in the cases in which a complete excision is done, the movements caused by swallowing may produce a small opening between the sutures. This drainage from the œsophagus naturally

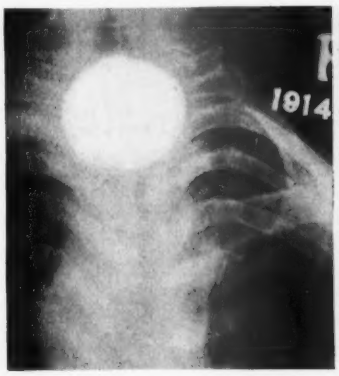

Fig. 9 (191431).

Fig. 10 (99356).

X-ray photographs of medium sized œsophageal diverticula.

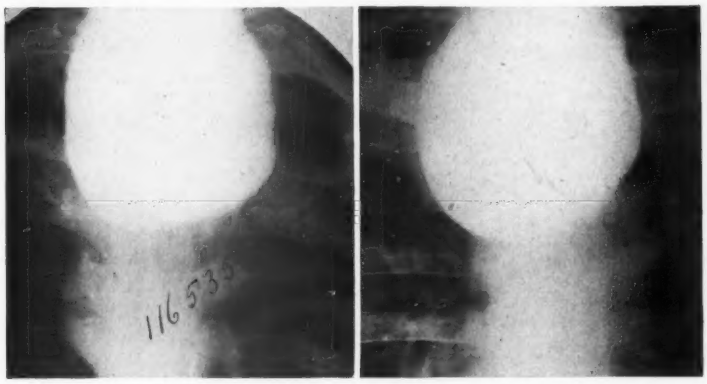

Fig. 11 (116535). Fig. 12 (8889).

X-ray photographs of large œsophageal diverticula projecting into the mediastinum.

passes down the anterior surface of the vertebræ into the mediastinum and may result very seriously. For this reason whenever the infolding operation, as described by Bevan, can be performed it certainly is the operation of choice. This method can be employed in the cases of the smaller sacs and in those in which the sac is of medium size, but if the diverticulum is very large and reaches down into the thorax, it would seem that it is preferable to employ the two-stage operation as devised by C. H. Mayo. Murphy described a two-stage operation for all cases. The first stage consists in dissecting the sac out of the surrounding tissues, twisting it, and suturing it in this position and allowing granulations to form about it for from twelve days to two weeks, before removing it at a second stage. The method, as employed by Mayo, is first to dissect the large sac out of the thorax, leaving

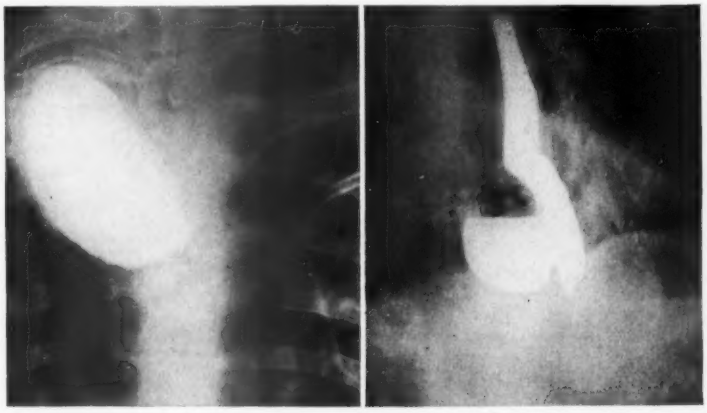

Fig. 13 (2492). Fig. 14 (197786).

Fig. 13 (2492). Shows the communication of the diverticulum with the œsophagus to be apparently lower than usual. This is probably due to the fact that the sac is not completely filled.

Fig. 14 (197786). X-ray photograph of a large diverticulum at the lower end of the œsophagus. Note abstract of history.

Figs. 15 and 16 (210657). Photographs made about the eighth day after the first stage of the two-stage operation. The diverticulum is dissected from the tissues of the neck and the skin is sutured to the neck of the diverticulum. The second stage consists of the removal of the sac. No anæsthetic is required in the second stage.

the neck attached without opening the sac during the first stage. After it is entirely freed, the wound in the neck is sutured and the sac left outside of the neck in the dressing. The skin edges are sutured to the œsophagus at its juncture with the diverticulum. After ten or twelve days adhesions have formed about the sac and it can be removed without an anæsthetic and the edges turned into the

TABLE I.— ŒSOPHAGEAL DIVERTICULA

Cases of diverticulum of the œsophagus (6 previously reported by Dr. C. H. Mayo)	35
Males	28
Females	7
Average age	54 years
Average duration of symptoms	5½ years
Difficulty in swallowing noted in all of the 35 cases.	
Regurgitation of food noted in 30 cases.	
First symptoms noted:	
Difficulty in swallowing	13 cases
Gurgling noise in the throat	12 cases
Regurgitation of food	8 cases
Choking sensation	2 cases
Tumor of the neck visible or palpable (left side 7; right side 3)	10 cases
No loss of weight in	8 cases
Loss of weight in	19 cases
Average loss	27 pounds
Greatest loss	65 pounds
Weight not given in	8 cases
X-ray diagnosis of diverticulum of the œsophagus in	24 cases
X-ray examination 1 month after operation showed the œsophagus to be negative in	4 cases
Bevan operation	1 case
Excision of the sac and inversion of the base	1 case
C. H. Mayo two-stage operations	2 cases
Size of the sac 1 to 4 ounces noted in	16 cases

TABLE II.

In operating, the approach was from the left side of the neck in all except 1 case and that was from the right side.

In 6 cases a transverse incision was made.

One patient had been operated on for diverticulum 1 year before coming to the Clinic.

There was recurrence in one case. The patient began to have trouble about 1 month after operation and was operated upon 9 months later by the two-stage operation. This was the only recurrence in the series.

TABLE III.— TYPES OF OPERATION

The sac was excised and the base inverted in	18 cases
The sac was excised and the base ligated and turned in in	4 cases
The Bevan operation was done in	3 cases
The two-stage operation (C. H. Mayo) was done in	10 cases

There were two deaths following operation, both on the second day. Both patients were known to be poor surgical risks; 1 a male aged 76 years, the other a male aged 73 years. The cause of death in both instances was cardiac disorder. One died after the first of a two-stage operation; one after excision of the sac and inversion of the base.

œsophagus. This operation is not difficult and is perfectly safe from any possibility of infection and has been very satisfactory in our cases in which the sac was fairly large (Figs. 15 and 16.)

The infolding operation in the case of small diverticula and the two-stage operation for large diverticula seem to be very satisfactory and safe methods of procedure in all cases of diverticula of the œsophagus. The results from these operations are very gratifying as almost every patient thus operated on has been entirely relieved of symptoms.

In our series of 35 cases in which operations were done there were 2 deaths. In each instance death occurred on the second day; both patients were very old and feeble. In one of these, because of many general contra-indications to operation, we taught the pa-

TABLE IV.

Patients alive at the present time	33
1 patient is living 10 years after operation.	
1 patient is living 9½ years after operation.	
1 patient is living 9 years after operation.	
1 patient is living 8 years after operation.	
2 patients are living 7½ years after operation.	
1 patient is living 7 years after operation.	
1 patient is living 6 years after operation.	
2 patients are living 5 years after operation.	
1 patient is living 4½ years after operation.	
3 patients are living 4 years after operation.	
2 patients are living 3½ years after operation.	
4 patients are living 2½ years after operation.	
3 patients are living 1½ years after operation.	
10 patients operated on during the past year.	

tient to pass a stomach tube, and for some months he lived by feeding himself in that manner; then the sac became so large that it produced a great deformity in the œsophagus. The patient could no longer pass the tube and an operation seemed imperative. The first stage of the operation was performed but death took place suddenly the next morning. The history of the second patient is much the same, except that the sac was smaller and was removed at one operation. This patient also died the morning following the operation. In two of the remaining cases, there was some evidence of a recurrence of the diverticulum. One of these patients was entirely relieved by passing a sound a few times, and in the other case it was necessary to reoperate for the recurrence. We have recently corresponded with nearly all of the 33 patients and found them to be entirely free from symptoms.

We believe that the infolding operation and the two-stage operation are the procedures preferred and can be performed with practically no mortality.

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EPITHELIOMA[1]

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THE term epithelioma, as the name implies, is a tumor composed of epithelium without any distinction relative to clinical malignancy or benignancy. If such specific cells as those lining the alimentary tract and comprising the sweat, sebaceous, buccal, salivary and mammary glands are still to be termed epithelium by histologists, then all so-called carcinomata are also epitheliomata. The term as utilized in this paper refers only to tumors of the epithelium of the skin, the glandular structures which are a part of it and other structurally similar tissues, although the subject matter does not include such benign epitheliomata as warts, moles, corns, leucoplakias, epithelial horns, etc.

From November 1, 1904, to January 1, 1916, more than 2,000 malignant epitheliomata were removed at the Mayo Clinic. The regional distribution comprises practically every portion of the human body which is covered by protective epithelium.

APPARENT TYPES

Structurally, the following apparent types are found, although they are probably not types but the results of variation in origin and cellular differentiation: (1) squamous cell-epithelioma; (2) melano-epithelioma; (3) non-melanotic melano-epithelioma; (4) basal-cell epithelioma; (5) adamantine epithelioma, or adamantinoma, and (6) mixed epithelioma.

Squamous-cell epithelioma. The squamous-cell epithelioma derives its name from the fact that the majority of its cells are of the

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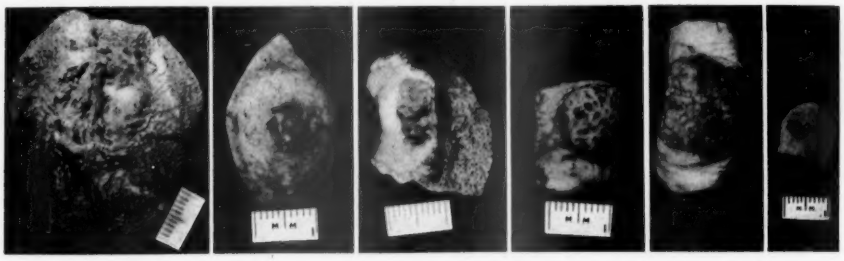


Fig. 1. Fig. 2. Fig. 3. Fig. 4. Fig. 5. Fig. 6.

Fig. 1. Squamous-cell epithelioma of scalp. (A71140.)
Fig. 2. Squamous-cell epithelioma of temple. (A96946.)
Figs. 3, 4, 5, and 6. Squamous-cell epithelioma of lip. (Cases A87045, A99884, A81521, and A92370.)

squamous variety. Protoplasmic processes (spines or prickles) are often seen connecting the cells, hence the name spinal or prickle-cell epithelioma. This type has a wide anatomic distribution, being found in any portion of the surface of the body and in such orifices as the mouth, nose, anus, and vagina. It is also found in the urinary tract and it occasionally occurs in the gall-bladder and other places that normally contain columnar epithelium (Figs. 10, 29, 30).

Grossly, the squamous-cell epitheliomata present marked variations. They may be elevated, depressed, flat, papillary, cauliflower-like, ulcerated, smooth, soft, indurated, whitish, grayish, yellowish or reddish. They usually start in leucoplakias, cracks, scabs, ulcers or papillomata. The papillary form is frequently found in the urinary bladder (Figs. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14).

There is also an equal variation from a microscopic standpoint. They are made up of cells of various shapes, sizes and degrees of differentiation (Figs. 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37). Some show a marked tendency to cornify, especially those of the lip, inside of the cheek, floor of the mouth, the tongue, skin, penis, and vagina (Figs. 26, 31, 32), while others in the cervix, urinary bladder, tonsil, inside of the nose, nasopharynx, and the antrum of Highmore show little tendency to do so (Figs. 35, 36, 37). Those that originate on the inside of the nose and the nasopharynx are not infrequently diagnosed as some form of sarcoma; in fact, it often happens that a metastasis is discovered in one of the lymphatic glands of the neck before the original growth is located.

Germinal or regenerative cells are always present, in fact, one not infrequently sees cellular arrangement and morphology resembling all the layers of the epidermis. While some squamous-cell epitheliomata are composed of very large flat cells (Fig. 28) others are composed of very small ones, resembling those of spindle- and round-cell sarcomata (Figs. 34, 35, 37). Under the low power of the microscope they occasionally resemble the cells of a basal-cell epithelioma (Figs. 38, 39); these, however, under the high power present definite prickles. Some epitheliomata show the morphologic characteristics of a spinal-cell and a basal-cell epithelioma, in fact, the two types of epithelium have been seen intimately connected in the same microscopic field (Fig. 40).

Melano-epithelioma. Melano-epithelioma, as its name indicates, is an epithelioma containing melanin. It is possible for this tumor to grow in any part of the body where protective epithelium is found. It may be elevated, pedunculated, flat, or apparently subdermal, black, brown, or partially black and white, or brown and white. The pigment is not always evenly distributed throughout the tumor. In some instances, the original tumors have very little or no apparent pigment and the secondary growth or growths will be jet black (Figs. 16, 17); the original tumor may be filled with pigment and the secondary growth or growths be free or practically free from it. Microscopically, spheroidal, spindle, and ovoidal, cells with

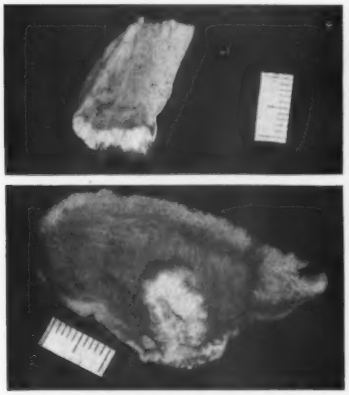
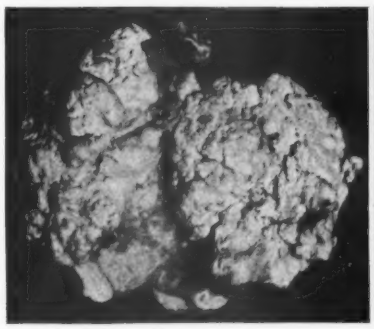


Fig. 7 (above). Fig. 8 (below). Fig. 9.

Fig. 7. Squamous-cell epithelioma of lip. (A74417.)
Fig. 8. Squamous-cell epithelioma of tongue. (A75909.)
Fig. 9. Squamous-cell epithelioma of larynx. (A89236.)



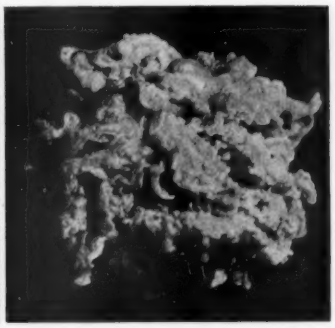


Fig. 10 (at left). Squamous-cell epithelioma of gall-bladder. (A163101.)
Fig. 11. Papillary epithelioma of urinary bladder. (A191496.)

or without pigment may be seen (Figs. 45, 46, 47). It has a marked tendency toward alveolar formation (Figs. 42, 44). This type of epithelioma has been discussed in a previous article by Broders and MacCarty (2).

Non-pigmented melano-epithelioma. This type of epithelioma has all the morphologic and clinical characteristics of the malano-epithelioma, except pigment. It is usually diagnosed as some form of sarcoma (Figs. 18, 48).

Basal-cell epithelioma. The tumor is commonly known as the rodent ulcer. Like other epitheliomata, it may be found on any surface of the body covered with protective epithelium. However, it is most often found on the cheek, outside of the nose, temple, eyelid, and forehead. It often appears in the skin as an elevated whitish nodule resembling an adenoma or cyst of a sebaceous gland, as an ulcer with indurated borders, or as a scaly lesion which exfoliates its superficial layers leaving a shiny surface, but showing little tendency to heal completely (Figs. 19, 20, 21, 22, 23, 24). The latter form is usually found in persons who are exposed to intense sunlight. It is a frequent occurrence in the sunburnt skin of farmers.

Microscopically, the tumor presents an equal variation of the squamous-cell type.

Fig. 12 (above). Squamous-cell epithelioma of cervix. (A62270.)
Fig. 13 (below at left). Squamous-cell epithelioma of penis. (A38258.)
Fig. 14. Section of epithelioma shown in Fig. 13. (A38258).

Its cells may be long and slender, short and thick, or round, oval or spindle-shaped. In addition to the variation of cellular morphology there is great variation in the arrangement of its cells. Some are alveolar or gland-like, the latter condition resembling the arrangement of the thyroid; others have a cactus-like appearance; some are composed of diffuse or circumscribed solid masses of cells, and others have a combination of different forms (Figs. 49, 50, 51, 57, 58). It derives the name basal-cell from the fact that its cells tend to differentiate to a form similar to the cells of the basal or germinative layer of the epidermis. As a matter of fact, all tumors arising in protective epithelium are basal-cell epitheliomata, the only feature distinguishing them is their cellular differentiation. Undoubtedly basal-cell epitheliomata are not infrequently diagnosed, endotheliomata, alveolar sarcomata, round-cell sarcomata, spindle-cell sarcomata, and adenocarcinomata. The cells of a pure basal-cell epithelioma are not supposed to contain prickles or spines but on account of their occasional presence it is often difficult to determine whether an epithelioma should be called a basal- or squamous-cell epithelioma. Prickle-cells are often found in so-called basal-cell epitheliomata and basal-cells can always be seen in squamous-cell epitheliomata.

Adamantine epithelioma or adamantinoma. This type of neoplasm has been taken into consideration because of its marked cellular resemblance and close relationship to the squamous-cell epithelioma. There are differences of opinion as to its histogenesis.

Fig. 15.

Fig. 16.

Fig. 17.

Fig. 15. Melano-epithelioma of right leg. (A57193.)
Fig. 16. Melano-epithelioma over left scapula.
Fig. 17. Metastatic melano-epithelioma of left axillary glands, secondary to growth shown in Fig. 16. (A143701.)

Falkson (4) held that in the formation of enamel-organs for the several teeth, there was a surplus and that these additional dental germs were the origin of the adamantinomata. Malassez (7) advanced the theory that they arise from epithelial rests or paradental epithelial débris. Scudder (10) states: "There is very great likelihood that the cells of the primary epithelial cord, having served their usefulness, are detached from the original enamel organ cells and may be the cells, which persisting, form the tumor under consideration." Buchtemann (3) and Kolaczek (5) believe that these tumors originate from the mucous membrane or the mucous glands of the mouth. Bland-Sutton (1) says: "They probably arise from persistent portions of the epithelium of enamel organs."

The number of theories which have been advanced relative to this tumor naturally leads one to believe that very little is known of its origin. It is usually located in the lower jaw at or near the angle, although a certain proportion is located in the upper jaw. Some of them attain the size of a grapefruit. On gross section the tumor proper is seen to be incased in a thin bony capsule, made up of cystic and solid areas (Fig. 25). The cysts range in size from 1 millimeter to 3 centimeters in diameter and are filled with a yellowish-brown mucoid fluid. They are separated by bony or fibrous septa. The cut-surface of a fresh specimen presents reddish granular solid areas and multiple small cysts.

Fig. 25. Adamantinoma, showing solid areas and cysts. (A59772.)

Microscopically, the tumor has a connective-tissue stroma and columns of variously shaped masses of epithelial cells. In one instance the epithelial columns showed direct connection with the epithelium of the gum (Fig. 52). This fact tends to suggest that this neoplasm arises from the regenerative or basal cells of the epithelium of the mucous membrane, which would be in accord with the histogenesis of all other types of epitheliomata. Deeper down in this same

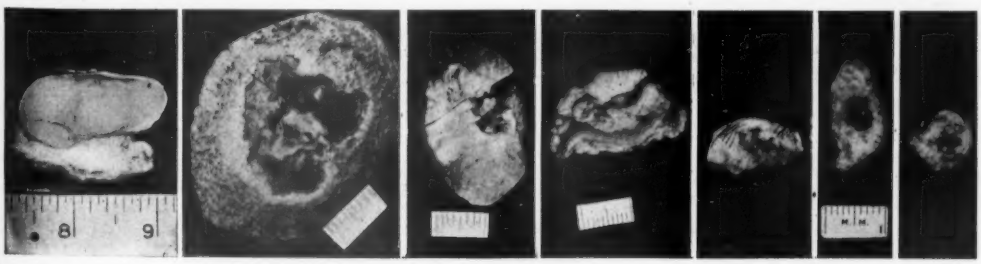


Fig. 18. Fig. 19. Fig. 20. Fig. 21. Fig. 22. Fig. 23. Fig. 24.

Fig. 18. Section of a nonmelanotic melano-epithelioma over left shoulder with metastases into glands of left axilla. (A186088.)
Fig. 19. Basal-cell epithelioma of scalp. (A50531.)
Fig. 20. Basal-cell epithelioma of nose (A55948.)
Figs. 21 and 22. Basal-cell epithelioma of eyelid. (A33173, A96196.)
Fig. 23. Basal-cell epithelioma of forehead. (A98228.)
Fig. 24. Basal-cell epithelioma of cheek. (A59758.)

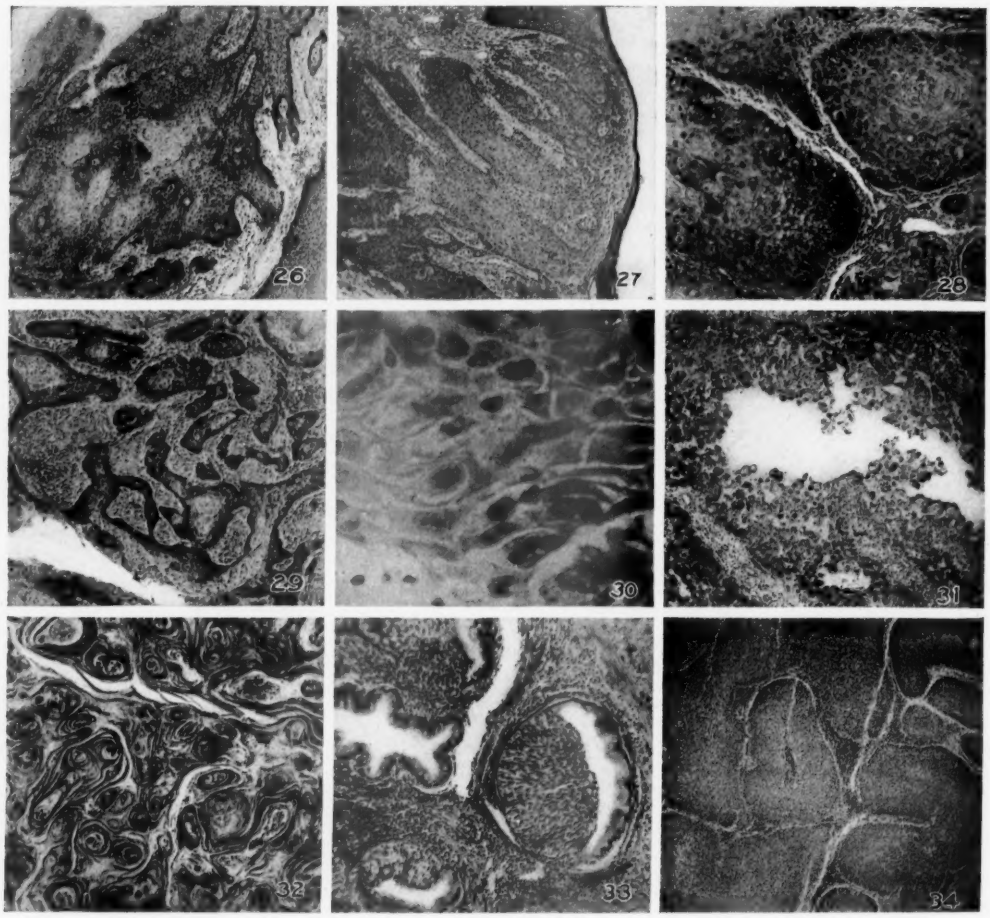


Fig. 26. Squamous-cell epithelioma of lip showing cornified areas. (A64692.)

Fig. 27. Squamous-cell epithelioma of penis, same as Fig. 13. (A38258.)

Fig. 28. Squamous-cell epithelioma of larynx. Note the large cells. Same as Fig. 9. (A89236.)

Fig. 29. Squamous-cell epithelioma of gall-bladder. (A163101.) Same as Fig. 10 (low power).

Fig. 30. High power of Fig. 29, showing intercellular bridges or prickles. (A163101.)

Fig. 31. Squamous-cell epithelioma of cheek showing partial cornification of cells. (A38455.)

Fig. 32. Squamous-cell epithelioma of a gland of the neck, secondary to an epithelioma of the floor of the mouth. Note the cornification of practically all of the cells. (A22297.)

Fig. 33. Squamous-cell epithelioma of cervix, showing invasion of the mucous glands by the epithelioma cells. (A53221).

Fig. 34. Squamous-cell epithelioma of gland of neck, secondary to epithelioma of larynx. This kind of epithelioma is not infrequently diagnosed an endothelioma. (A55450.)

tumor cellular masses with the early cyst formation may be seen (Fig. 53).

The adamantinoma presents two distinct types of epithelial cells (Fig. 53). The outer or columnar cells, which are undoubtedly the germinal or regenerative cells, correspond to the columnar germinal or regenerative cells of the enamel-organ. These also correspond to the basal or germinal cells of the epidermis from which the enamel-organ is

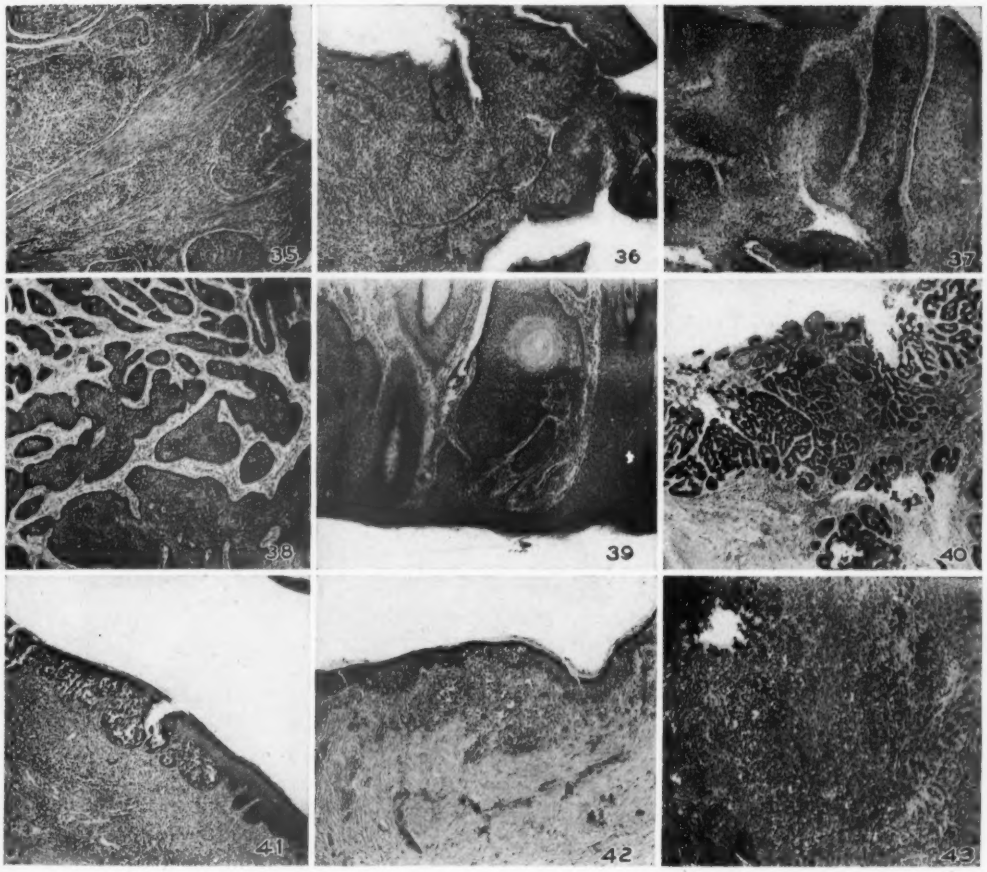


Fig. 35. Squamous-cell epithelioma of cervix, showing invasion of muscle by epithelioma cells, same as Fig. 12. (A62270.)

Fig. 36. Papillary epithelioma of urinary bladder, same as Fig. 11. (A191496.)

Fig. 37. Squamous-cell epithelioma of tonsil. Metastases from this kind of epithelioma are not infrequently diagnosed some kind of sarcoma. (A94680.)

Fig. 38. Squamous-cell epithelioma of the cheek with a low power appearance of a basal-cell epithelioma. (A114881.)

Fig. 39. Squamous-cell epithelioma of the eyelid with a low power appearance of a basal-cell epithelioma, excepting the epithelial pearl. (A42356.)

Fig. 40. Epithelioma on the outside of nose, showing squamous and basal cells intimately connected in the same field. The basal cells present a gland formation. (A20310.)

Fig. 41. Early melano-epithelioma of the labium. (A99046.)

Fig. 42. Melano-epithelioma of the right leg, same as Fig. 15. (A57193.)

Fig. 43. Metastatic melano-epithelioma of a gland of the right groin, secondary to a melano-epithelioma of the leg, same as Fig. 42.

derived. The polygonal and stellate cells, which are so characteristic, represent an advanced stage of differentiation. They sometimes contain prickles which also have corresponding cells in the enamel-organ and resemble the prickle-cells of the epidermis. These cells appear to disintegrate and form cysts before they reach the stage of cornification. Similar cysts are found in squamous-cell epitheliomata as a result of cell disintegration. New (8) has written an article describing this type of epithelioma.

Mixed epithelioma. This type of epithelioma is met with infrequently. It is usually

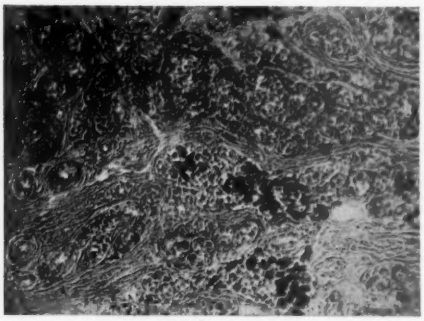


Fig. 44. Melano-epithelioma of the skin of the groin. Note the alveolar arrangement. (A80193.)

located in the palate, although it may occur in other locations. Two cases were observed in the Mayo Clinic in which the tumor was in the palate. The first occurred in a girl 16 years of age. It was fairly regular in outline and measured 2 by 2 by 2 inches. When a specimen was removed for microscopic diagnosis an ounce of straw-colored fluid escaped from what appeared to be a cyst. Microscopically, the tumor contained squamous epithelium directly connected with the mucous membrane of the palate (Fig. 54). Other areas showed masses of squamous epithelium separated by fibrous septa, plus the presence of mucous glands and gland-like structures that were continuous with the squamous epithelium (Fig. 55).

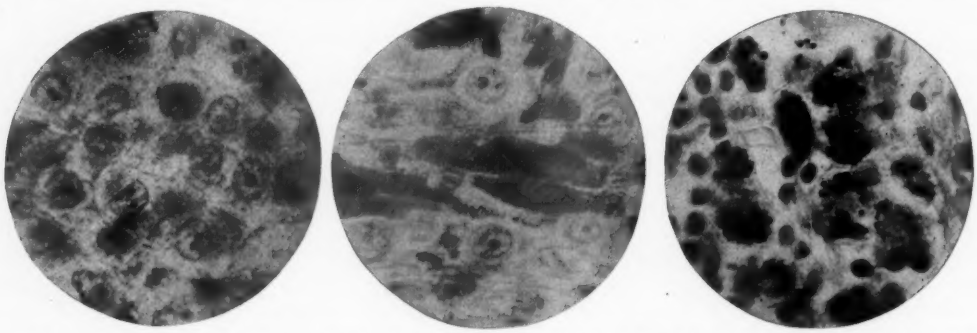
The second tumor occurred in a man 64 years of age. It was encapsulated, measured 1 by 2 by 1 inches, and on section was found to be a solid mass free from mucus. Microscopically, the tumor contained numerous gland-like masses, made up of squamous epithelium in which the central cells had degenerated in a similar manner to that in an adamantinoma. This tumor differed from the first, in that it did not contain mucous glands. It also contained what appeared to be true glands, like those found in the breast with the exception of mammary grouping (Fig. 56). Similar tumors have been found in other locations (9).

DISCUSSION

In view of the fact that epitheliomata vary so much in the structure of the cells and their arrangement, it seems wise to consider the anatomic possibilities of origin and other reasons for the apparent types.

A clear conception of the structural nature and biologic significance of such an interesting and important group of neoplasms cannot be obtained without a knowledge of the embryologic development of the skin and its accessory organs.

If the life history of the skin is traced it is begun with the ectoderm of the three-layer stage of embryologic development. This layer of partially differentiated epithelium becomes more highly developed to form the so-called skin of the embryo. At first it is composed of one layer of cuboidal cells, which, with the further development of the embryo, becomes differentiated to form two or more layers of cells — the outer layer differing from the first layer in being flatter



Figs. 45, 46 and 47. Photomicrographs showing variety of cells which are found in melano-epitheliomata. (A105603 and A36641.)

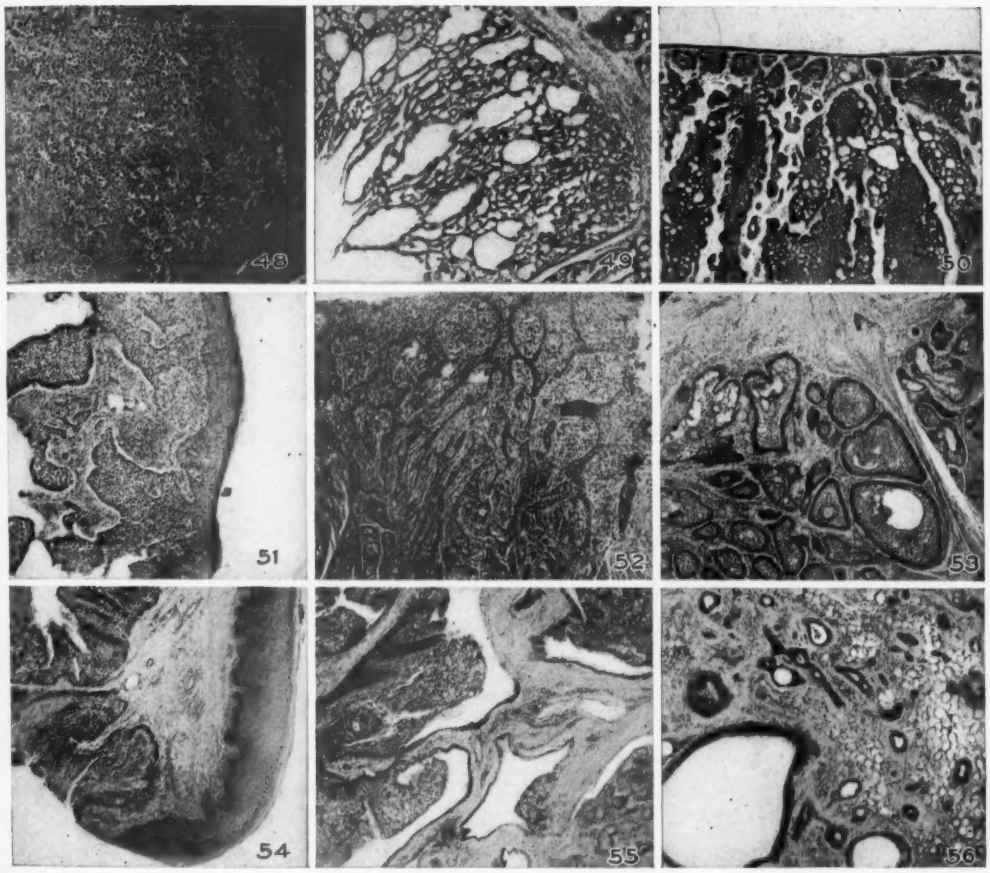


Fig. 48. Nonmelanotic melano-epithelioma, same as Fig. 18. (A186088.)

Fig. 49. Basal-cell epithelioma of the outside of nose. Note the close resemblance to thyroid. (A38151.)

Fig. 50. Basal-cell epithelioma of forehead, showing gland-like and solid areas. (A33009.)

Fig. 51. Basal-cell epithelioma of nose, showing solid plugs of cells. (A38366.)

Fig. 52. Adamantinoma, showing direct connection with the epithelium of the gum. (A68435.)

Fig. 53. Section from center of tumor shown in Fig. 52, showing different types of cells and early cyst formation.

Fig. 54. Mixed epithelioma of palate showing direct connection of tumor cells and epithelium. (A147265.)

Fig. 55. Different field in same case as Fig. 54, showing squamous and gland epithelium intimately connected. Note the mucous glands in one corner.

Fig. 56. Mixed epithelioma of palate showing squamous epithelium and glands similar to those of the breast in the same field. (A156093.)

or less cuboidal, with their long axes parallel with the surface of the body.

With both antenatal and postnatal development the secondary layers become more differentiated. In this stage, embryologists have termed them the "stratum germinativum" of the skin or the germinating layer of the epidermis.

The history of the cells of this layer proves that they retain the power of divergence into several structural and functional derivatives. It may be spoken of as a plastic layer, at least in the embryo. This expression of its broad functional capacity is based on its behavior in the development of the appendages of the skin; namely, hair, nails,

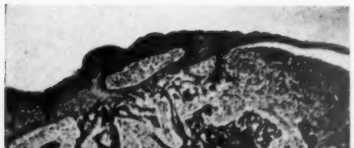


Fig. 57.

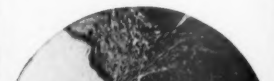


Fig. 58.

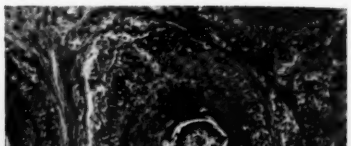


Fig. 59.

Fig. 57. Basal-cell epithelioma of cheek. (A71761.) Similar to Fig. 50.

Fig. 58. Early basal-cell epithelioma of forehead (Ao8228) same as Fig. 23.

Fig. 59. Early epithelioma of a hair follicle. (A96196.)

teeth, sweat-glands, sebaceous glands, buccal glands and mammary glands.

Histologic specimens taken through the embryonic skin and subcutaneous tissue in various portions show developmental activities of the stratum germinativum other than the production of epidermal cells.

The diversity of possible variation of products of this layer of cells is not only visible in embryologic development but it may be seen in the change from columnar epithelium of the lower rectum, the uterine cervix, the urinary bladder, and the mouth, in all of which organs the regenerative cells produce squamous or stratified epithelium instead of columnar epithelium when a protective occasion arises.

It has been shown definitely that a chronic destruction of specific tissues gives rise to certain definite histologic, biologic, and clinical phenomena in the regenerative cells of such tissues. These are characterized histologically by hypertrophy, hyperplasia and migration, biologically by hyperactivity, reproduction (neoplasia) and migration, and clinically by benignancy, uncertainty and malignancy (6). It has been shown, further, that the cells of the migratory (malignant) stage, when they acquire an environment somewhat similar to their normal environment, attempt to differentiate into the tissue cells for which they were originally intended. This is seen in the case of glandular tissues as well as protective epithelial tissues. In the cases of the epitheliomata under discussion in this paper, there are several possible points of origin. The germinative cells of the epidermis, sebaceous glands, sweat glands, oral and nasal mucous glands, and the hair follicles, all constitute possible sites of origin for neoplasia. Neoplasia arising in the first, second, and fifth of these structures has already been seen by the writers.

Theoretically one should be able to determine the origin of neoplasia from the character of the differentiation in the new-growth. While this may be theoretically possible it is only infrequently possible because malignant neoplastic cells rarely if ever become completely differentiated; if they did they would be of benign conditions because they would only produce accessory organs. Cells in the partially differentiated portions of malignant neoplasms which are more nearly morphologically like certain tissues than like any other tissues are seen. This is especially true, as has been stated in the cases of certain epitheliomata in which the cells undoubtedly resemble cornified epithelium and sebaceous cells. In the cases of hair follicles the only evidence that exists from the possible origin of some of the epitheliomata in these structures, is the fact that early migratory neoplastic cells have been found arising in the stratum germinativum of the follicles (Fig. 59).

There is one other possibility within the range of analogy to facts as they occur in the human body. From the reaction of regenerative cells of tissues which, by the so-called process of metaplasia, become transformed from columnar cells into stratified squamous cells, it seems possible for the regenerative cells of any of the accessory organs of the skin to produce cells similar in structure to those of any other accessory organ. This possibility is merely mentioned to stimulate investigation, and in no way is it held to be responsible for any of the conditions reported herein.

In presenting this brief description of typical malignant conditions arising in the skin and its accessory organs practically no attempt has been made to report the clinical aspects of the subject. The results of detailed gross, histologic, and cellular studies with their clinical significance will be presented elsewhere in the near future.

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EXFOLIATIVE VAGINITIS

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SINCE 1901, when Gellhorn reported a case of exfoliative vaginitis and collected the meager literature on the subject, no further instance of this exceedingly rare condition has been recorded. The two cases which it has been my good fortune to observe, therefore, merit publication.

Case 1. A woman of 30 came under my care in December, 1910. History: Previous health fair; always nervous; menstruation began at the age of 17 and has never been regular, the intervals ranging from two weeks to two months. The flow lasted two days but in the last few years the amount has diminished and the duration decreased to half a day. She has had dysmenorrhœa throughout her menstrual life. She had one normal confinement nine years ago and one miscarriage four years ago. Since the birth of her child, pain has been constantly present in both lower quadrants of the abdomen but more severe on the right side. Examination showed a small intramural fibroid situated anteriorly in the angle between the cervix and the body of the uterus. Nothing else abnormal was found in the pelvis. In March, 1911, the fibroid was enucleated and the chronically inflamed appendix was removed. The patient enjoyed good health until September, 1911, when she returned stating she had passed a sac from the vagina a few days ago, but aside from a few cramps this did not cause her much discomfort. On examination nothing abnormal was found except a highly colored vagina. Two weeks later she returned bringing with her a sac which had passed in the same manner. The sac proved to be a complete cast of the vagina; the latter was again found to be highly reddened. Forty of these casts were passed from September, 1911, to September 1912, at intervals of one to three weeks. The expulsion of a cast was in no way related to menstruation or influenced by sexual intercourse, douches, excitement, or the like. The patient was unable to give any explanation for the formation of the casts. She was kept under fairly close observation to eliminate all possible causes such as douches and suppositories but the casts continued to form and pass.

Case 2. A woman of 39 years visited the gynecological clinic of the Washington University Hospital to ascertain why she had not menstruated for the past year. No symptoms of any nature were present. The menstrual history had been normal, and she had passed through three normal pregnancies. On examination, the introduction of the index

Fig. 1. Complete cast of vagina. At left, posterior aspect; at right, front view. A small circular opening at *b* corresponds to the external os uteri. The wide, irregular opening at *a* corresponds to the vaginal entrance. (Gellhorn.)

finger in the vagina revealed a crumbling substance lying loosely. This was removed and proved to be a complete cast. The vagina appeared normal and was not sensitive to touch. The pelvic organs were normal. On questioning her I learned she has passed, to her knowledge, two other casts within two months previous to that day. No symptoms attended the expulsion of the casts. The cast was identical with those passed by the first patient.

The specimens obtained in these two cases, were, both in gross appearance and histologic structure, identical with those observed by Gellhorn, and I reproduce in the following the pictures and the description given by him.

White pear-shaped sacs 10.5 centimeters in length and 4.5 centimeters in width (Fig. 1 and 11). The anterior and posterior walls lie flat upon each other, thus exactly reproducing the shape of the vagina, of which the walls are normally in contact and flattened from before backward. Fig. 1, *b*, shows a small hole, surrounded by a circle of thickened tissue which is found in all of the membranes and in the same place. This opening represents the external os of the uterus. It lies about 1.5 centimeters below the top of the sac, due to the fact that the posterior wall of the vagina is longer than the anterior. Consequently the figure at the left represents the cast of the posterior and the one at the right that of the anterior wall of the vagina. The lower and narrower end of the sac shows irregular fringes forming the edges. This opening corresponds to the entrance of the vagina. The average thickness of the walls is that of common letter paper. In some thicker portions of the membranes, two layers may be separated by means of fine dissecting forceps, but by doing so the membranes easily tear, they being very fragile.

Both inner and outer surfaces of the sacs are rather rough. On the latter there are wrinkles and folds, and corresponding to these on the inside there are ledge-like elevations. These ridges while running in a transverse direction in the upper part are longitudinal in the lower portion and do not disappear even if put on the stress. The roughness is due to the presence of a series of transverse ridges in the vaginal wall, the rugæ extending from longitudinal ridges, the columnæ vaginalis upon each wall. The cast thus reproduces the finer details of the formation of the vagina.

On examination with a simple magnifying glass there is to be seen a dense network of white and apparently homogenous strings. The tissue between the latter is a little thinner and therefore more transparent.

Under the microscope the membrane consists of three or four layers of horny squamous epithelium (in my first case nine distinct layers could be seen), which being intimately connected formed a regular mosaic. In the section cut parallel to the surface, the pavement-like arrangement of the large horny sqamous cells is seen, here and there interrupted by circular smaller and larger openings around which the cells are smaller and closer together. The openings correspond to the ledges of the membrane which have been cut by the direction of the microtone knife. The ledges of the membrane on their part are produced by the papillæ which are found on the rugæ of the vaginal mucous membrane.

An infiltration with round cells, which we usually meet with in the normal as well as in the inflamed mucous membrane of the vagina, cannot be found. Neither was there any formation of fibrin, as Weigert's stain gave a negative result.

From the description of the foregoing cases it is evident that an exfoliation of true membranes had taken place. This exfoliative or membranous variety of vaginitis in which a complete cast of the vagina or more or less extensive pieces of vaginal mucosa are discharged, must be clearly differentiated from a pseudomembranous exudation in which a pyofibrinous coating is found upon the vaginal mucosa. Two cases of this latter kind have been observed recently by Shoemaker (2) during the latter months of pregnancy.

The etiology of true exfoliation in the majority of instances remains unexplained. Some of the authors (Thomas, 3; Fritsch,

4; Fraenkel, 5; and Lee, 6) think that it is usually combined with exfoliative endometritis, and according to Garrigues (7) found in hysterical women, or as in Griffith's (8) and Hopkins' (9) cases, it may appear together with a membranous enteritis, the latter being generally believed to be of nervous origin. The cases reported by Porter (10) show that exfoliation of the mucous membrane may occur in the course of a severe inflammation following masturbation.

The majority of authors, however (Tyler, 11; Ziegler, 12; Veit, 13; Gebhard, 14; Pozzi, 15; and Keating, 16), consider thermic or chemical irritants the main causes of the exfoliation. These authors maintain that the lining membrane of the vagina separates in the form of translucent flakes in consequence of the use of douches which are too hot or those which contain an excess of caustic ingredients, such as phenol or chloride of zinc. The same widespread exfoliation of the epithelial coat of the vagina is seen following the use of strong astringent drugs. To this group belongs Gellhorn's case, in which a complete exfoliation was caused by vaginal suppositories containing a caustic substance, the exact nature of which could not be detected. In neither of my own cases could any etiological factor be elicited. It is possible that bacterial infection or pathological changes in the deeper vaginal tissues play a rôle in the causation of the condition, but numerous smears made at different periods, from the vaginal secretions in my cases showed nothing unusual, and as such cases do not come to autopsy, material for microscopic study of the deeper vaginal structures is not obtainable.

The changes in the vagina seem to be quite typical and while the process may begin in any portion of the canal, it usually begins near the vulva (Lee). The surface of the vagina is covered with a white coating and pieces can be removed with a forceps. This may be attended by discharge from the subepithelial surface, while in other places the vagina appears quite dry (Smith).

In my own cases I have found the vaginal mucosa highly colored immediately after expulsion of the cast. Repeatedly punctiform bleeding was seen here and there, where the exfoliation had exposed the papillæ and opened the capillaries in the latter. This process is somewhat analogous to the minute bleeding seen in senile vaginitis and in psoriasis when the scale is lifted from the skin. Within four or five days after the cast is expelled the vagina regains its normal appearance and the lumen remains unaffected. A marked reduction in the width of the vagina can take place only when the exfoliation has taken place in the deeper layers and the subjacent connective tissue is exposed, but even then contraction of the vaginal canal need not occur as shown by the case observed by Barsonkoff (17), where a patient had a hæmorrhage as a result of sulphuric acid poisoning. A few days later without any elevation in temperature she passed a large slough representing a complete cast of the vagina. This included the entire thickness of the vaginal wall and some of the subjoining connective tissue, yet the vagina remained normally patent.

The exfoliated shreds or laminæ bear the marks of the rugæ of the vagina. If the process effects the entire vagina at the same time, there results a complete cast of the vagina, which, however, seems to be exceedingly rare; for the only cases which exhibit this completeness of the molds are those reported by Gellhorn and Barsonkoff and my own two cases. While practically in all instances the exfoliation took place but once, the formation and expulsion of vaginal casts in my second case occurred three times, in Gellhorn's case nine times, while in my first case this startling phenomenon manifested itself forty times in one year.

The symptoms accompanying this condition are not always sufficiently marked to attract attention; if present, they precede the expulsion of the cast. For twenty-four hours there may be sharp, cramp-like pains in the lower abdomen. A slight discharge which at times is streaked with blood is noted. When the cast is not expressed easily, the pains become expulsive in nature and these pains last until the patient is relieved. In such instances considerable bleeding is present at the time the cast is expelled

or removed as was found on a number of occasions in my first case.

The appearance of the vagina makes the diagnosis easy. Before the separation of the cast the vagina takes on a whitish appearance, the changes first occurring near the vulva as a rule. Pieces of membrane can be picked off the vaginal wall, and this leaves behind a bleeding surface. When the cast has been completely thrown off the new mucous membrane has already formed but appears to be highly colored. It is sometimes necessary to differentiate the condition from exfoliative endometritis, but this offers no difficulty. The vaginal casts are larger and have two openings, and the vagina has a characteristic whitish appearance during the separation of the cast. It is to be remembered that the two conditions may occur simultaneously.

No local treatment seems to influence the condition. If the cause can be discovered and removed, the trouble subsides.

SUMMARY

Exfoliative vaginitis is a rare affection which is characterized by a superficial necrosis of the vaginal mucosa. The process manifests itself in the expulsion of a complete cast of the vagina or of more or less extensive pieces of the mucous covering. Microscopically, the discharged specimens are composed of vaginal epithelium. The etiology of the disease may, as a rule, be traced to thermic or chemical irritants, but no such cause could be elicited in my two cases. Of these, the first occupies a unique position in literature in so far as number and completeness of the vaginal molds are concerned.

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FIBROSARCOMA OF THE MESENTERY[1]

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THE tumor was removed from a patient, age 32, who was admitted to Mercers' Hospital, Dublin, on November 3, 1917, with the following history:

The patient has been married five and one-half years, and is a III-para. The last pregnancy was in June, 1916. She said that two years previously she had felt a small lump in the abdomen, which gradually increased in size but did not produce any symptoms other than malaise, until Thursday, November 1, when she complained of soreness and fullness in the abdomen, loss of appetite, constipation, and eructation. There was no menstrual abnormality beyond the fact that the amount was sometimes copious. She menstruated in October and also soon after admission to the hospital.

Examination of the chest and of the urine revealed that both were normal. She had a poor appetite and was constipated. Her general appearance was good. The temperature was 102° F. on admission, was 101° and 100° on the second and third evenings, and was normal after this.

Abdominal examination on admission revealed a globular tumor about the size of a small football, occupying the lower part of the abdomen and extending just above the umbilicus. It was mobile with an irregular nodular surface, and of solid consistency. There was no fluctuation. During the nine days in hospital pending operation, the tumor increased in size, extending to midway between the umbilicus and the ensiform cartilage. On vaginal examination, the cervix uteri was found

[1] Case shown at the Obstetrical Section of the Royal Academy of Medicine in Ireland, November 30, 1917.

to be in the long axis of the vagina. The body of the uterus and the adnexa could not be distinguished separately from the tumor. I decided to operate. When the abdomen was opened, it was only possible to get two fingers in, for the tumor was adherent to the parietal peritoneum. By carefully separating with the fingers, it was at length possible to get the hand into the abdomen and to separate the tumor from the parietal peritoneum to which it was adherent in the full extent of the abdomen. When at last the mass was delivered, it was apparent that many feet of intestine and much mesentery were attached to it. The intestines were sponged off the growth with wet wipes, a small pedicle stretching from the mesentery was ligated with catgut, and the tumor was removed. The examination of the pelvis revealed a normal condition of the uterus and adnexa.

The abdomen was closed, the patient had an uneventful convalescence and went home on the thirteenth day.

Professor O'Sullivan kindly examined the specimen at the Dublin University Laboratory and made the following report:

The tumor forms an oval mass about 10 inches in length and 7 inches in breadth. It consists of two parts, separated by a firm capsule. The larger part is of a uniform dark red color with areas of deep black; the consistence is that of a ripe pear, it cuts easily. In places there are cavities, the largest about 1½ by ¾ inches with a shiny surface. These contained a thin red fluid, a great quantity of which poured from the cut surface when the tumor was opened. The smaller portion of the tumor is on the outside very dense, dead white in color. The inner portion is degenerated and broken down, leaving a cavity with ragged edges containing a brownish fluid.

On microscopic section the larger part of the tumor showed a tissue composed of wavy fibers more or less dense, and cells scattered through them with thick oval or rod-shaped nuclei of small size. Mitoses were not observed. In some places the fibers are very dense, in others they run in thick strands nearly parallel, leaving narrow spaces between them. The spaces do not appear to have any regular cell lining. Many of the veins in this part of the tumor are thrombosed. The tissue around these thrombosed veins is œdematous. Hæmorrhages occur in places, and a certain amount of blood pigment was seen in unstained sections.

The smaller white portion of the tumor shows on the outside a dense capsule of compressed fibers with no nuclei visible. As one passes inward the fibers become looser and the tissue becomes more and more cellular. The nuclei of the cells become more various in size and shape, and the tumor takes on the characters of a spindle-celled sarcoma. Further in, the growth becomes completely necrotic, breaks down, and forms the thick brownish fluid mentioned above. The vessels in this part of the growth are calcified.

I think the term fibrosarcoma describes the character of the growth.

The large benign portion of the tumor was superior in the abdomen, and it was from this that the pedicle sprang. It will be seen that the main part of the tumor was a pure fibroma and Professor O'Sullivan cut many sections to verify this. Bland Sutton[1] states that pure fibroma is a very rare condition and he dwells on the difficulty in distinguishing between myomata, slowly growing spindle-celled sarcomata, and pure fibromata. He points out that fibromata *may* occur in the ovary, the uterus or in the intestine, apart from two or three other extra-abdominal situations, and the question in this case is: What was the origin of the tumor? There are several possible solutions of this problem.

1. That it arose from the intestinal wall. This may be disregarded.

2. That it was a uterine tumor with a thin pedicle which at some time or other had become separated from the uterus, that it had become adherent to the mesentery and intestines, and had formed a pedicle to the former. This is unlikely, for there was no sign of such separation.

3. That it was a mixed tumor of embryological origin. The last seems to me to be the most feasible hypothesis, for when the embryological question is considered it is found that Fuss[2] in his work on the genital cells of man and mammals traces the path of these cells from the entoderm of the yolk sac to the genital region in later stages, and holds that inclusive of the human embryo, the so-called "germinal epithelium" plays only a very unimportant rôle in the genesis of the sex cells, and begins to proliferate only when the majority of the genital cells, coming originally from the "yolk sac entoderm," i.e., the epithelium of the alimentary canal, have arrived at their destination in the genital region. In other words the tumor might be due to a wandering genital cell which should have gone to the genital tract, in which case the tumor might have been found to arise from the uterus or the ovary.

[1] Bland-Sutton. Tumours.

[2] Fuss. Arch. f. mikr. Anat., 1912, lxxxi, 1912. Quoted by Bamville. J. Anat. & Physiol., xlix.

SURGICAL METHODS IN THE TREATMENT OF MALIGN AFFECTIONS OF SUPERFICIAL LYMPHATIC TISSUE[1]

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A MALIGN affection of lymphatic tissue may be regarded as an inflammatory or neoplastic process which provokes in an individual no sustained tendency to local recovery and possesses the power of ultimate extension by whatever means to increasingly more widespread involvement of this tissue, leading thereby directly or indirectly to death. Such affections may originate in lymph glands or, having begun in other tissues, show in their manner of extension a predilection for the lymphadenoid tissue. It is conceivable that primarily all are reactions to some form of irritation and are focal in origin.

The degree of preponderance of the destructive potentiality of any given morbid process over the power of local and general resistance of the individual determines its relative malignancy. Accordingly tuberculous lymphadenitis would be considered a slightly malign affection in a minority of individuals, carcinomatous involvement of lymph glands a very malign process in a great majority, whereas the entire group of closely related diseases, leukæmia, aleukæmic (aleukocythemic) leukæmia, chloroma, lymphosarcoma, primary endothelioma of lymph glands, malignant lymphoma, Hodgkin's disease, etc., has hitherto been accepted as hopelessly malignant.

As a result of the attention that has been given to the problems of tuberculosis, tuberculous lymphadenitis has not alone decreased in frequency but has also come to be considered so benign an affection that its possible menace to life is now, as Dowd's [2] work indicates, dangerously underestimated. The cure of cancer proclaimed an impossibility by only the last generation, has not alone been established for virtually all tissues primarily affected, but the proportion of recoveries is steadily increasing. Permanent recoveries are recorded in individuals who had suffered from Hodgkin's disease.[3]

This progress has come in part through practical appreciation of the manner of inception and the modes of advance of disease and in part through a combination of the operative procedures thus found to be indicated with such measures in postoperative treatment as lead to an increase in local and general resistance. For example, it has been demonstrated that the removal of all accessible tissue affected in tuberculosis is not essential to a permanent clinical recovery in every case, though some individuals will only so recover after a major portion of this tissue together with the primary focus has been extirpated, even if the best of general treatment has been provided from the onset of this disability. Similar observations have been made in the treatment of Hodgkin's disease. Likewise a carcinomatous mass may disappear spontaneously and permanently, though the disease persist or extend elsewhere, or an individual may make a permanent recovery following an incomplete excision of a cancer.

It is difficult to explain such phenomena upon any other basis than that of immunity, hence the significance of the factors entering into the constitution of local and general resistance.

The work of Bunting,[4] James B. Murphy,[5] and Theobald Smith[6] indicates that the functional integrity of the lymphatic system is one factor of fundamental importance in the defense against these malign processes. On the contrary, Tyzzer's[7] careful observations upon the modes of invasion of an unsually malignant transferable mouse cancer have convinced him that in carcinoma the lymphatic, more particularly the lymphocytic, reaction is less significant. It is perhaps fair to state in this connection that in the presence of extreme malignancy a very limited reaction of this type is to be expected hypothetically.

[2] Dowd, Chas. N. J. Am. M. Ass., 1916, lxvii, 499-504.
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[5] Murphy and Morton. J. Exp. Med., 1915, xxii, 204-211.
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[1] Read before the Western Surgical Association, St. Paul, Minnesota, December, 1916.

Experience, gained in a prolonged study of all these diseases, has led me to a conviction that an accurate interpretation of the leucocytic formula, with due consideration of all other evidence, is at present the most reliable and delicate indicator of the state of general resistance and of the immediate and remote effects of treatment upon it. Comparative histological studies of tissues obtained at operations during different stages of a disease in the same individual, as well as of that excised from other patients of different ages and various stages and types of the same affection justify the following tentative assumption: Local resistance varies directly with the ability of the irritated tissue to react with the least abnormal regenerative variations. These consist in an intensive round cell infiltration, succeeding a constant neutrophilic and more variable eosinophilic accumulation and preceding a fibroblastic proliferation which is accompanied by the development of few or no abnormal cell (e.g. giant) forms or cell (e.g. sarcomatous, endotheliomatous) growths.[1]

This assumption holds true in spite of the fact that no power of specific tissue regeneration is more important or its impairment more easily recognized than the hæmatopoietic because in these chronic diseases the variations in histogenetic powers appear gradually and there usually are differences between those of diverse tissues, or even in the same tissues in several parts of the body. In exceptional instances, an individual apparently in fair condition may prove to be incapable of making fibrin adequate to primary healing or quite the contrary may be the fact. A possible explanation of such perplexing observations is the considerable fluctuation in the reserve powers of local and general resistance which repeatedly approach the vanishing point after the early stage in those types of disease. This would explain the difficulty in forming therapeutic judgment, a matter of prognosis, dependent as it is entirely upon those indeterminate factors and their unknown interrelationship.

Divers as are the diseases here considered, we believe that they exhibit in their methods of attack and in the protective reactions they provoke such constant phenomena, common in some degree to them all, that therapeutic principles established for one, find rather general applicability. The type of surgical intervention to be advanced as essential is based upon the interpretation of the pathology of malign affections given above and upon the following conception of common features in morbid physiology. The powers of resistance of the individual usually after an initial rise, decrease progressively though irregularly. If the process be unchecked, sooner or later, a material diminution in resistance, prone to be sudden, is manifested clinically by an acute intensification of symptoms and often by a proportionately rapid dissemination of the disease. A progressive anæmia, secondary in type, is constant; cachexia is common in the more chronic forms and all, except possibly uncomplicated cancer, are febrile at some stage of their progress. Indeed, the clinical pictures exhibited by some individuals suffering from these diseases may be so similar that a positive diagnosis is possible only through a histological study of the lesion by a competent pathologist. Generally the extent of the disease revealed at operation or autopsy exceeds that recognized at previous examinations. Quite as constantly but to an even greater extent, the reserve powers of resistance and regeneration are less than can be estimated by any clinical methods now available.

Rational treatment is an *exact* play upon the powers of local and general individual resistance against the ineradicable portion of the morbid process. This method of attack must be based upon an accurate knowledge of the factors leading to therapeutic failure rather than upon a general conception of empirical methods reputed to have preceded fancied or occasional recoveries or by accepting any less accurate philosophy of treatment even though successful in a high percentage of reported cases. Subject to individual varia-

[1] NOTE.— Sarcomatous metamorphosis of the connective-tissue framework in carcinoma has been seen to occur spontaneously in human cancer and has been produced experimentally by Ehrlich. Comparable transformations have been noted in Hodgkin's disease by numerous observers and I have recognized at least one example of a similar change in tuberculous lymphadenitis.

tions the clinical applications of the therapeutic measures leading toward recovery are easily stated. First the primary focus or portal of entry of the disease must be eliminated. Second, a subtraction from the total amount of disease adequate to place the balance of power emphatically upon the side of individual resistance must be so achieved as not to decrease general resistance, yet to increase local resistance by the prevention of local recrudescences. Third, the subsequent play upon the powers of general and local resistance must be continued long after all evidence of the disease has disappeared.

Surgical methods are subject to such great variation in application that they are more presentable in principle than in technical detail. Extreme examples will show the limits of these variations.

The earlier and more favorable the disease, the more radical should be the extirpation. It is always safer to assume that the process is more than apparently malign, of greater dissemination than demonstrable and that individual resistance has been diminished dangerously. Thus only can a patient suffering from a potentially lethal disease be given *every* chance of recovery with minimal danger at a time when, if ever, prognosis should be good. The usual hypothetical objection to this proposition can be answered by the results of clinical experience.

Mortality from radical operations undertaken at an early stage of disease should be no greater than after incomplete interventions. Wound healing is as rapid and as favorable, and convalescence, therefore, not more protracted. Functional results are similar since, with one possible exception, every essential vessel, nerve and muscle can be preserved. Even the cosmetic results, negligible as they are under such conditions, may be made but little more unsatisfactory. The inherited superstition that lymph glands thus eradicated do not regenerate, is contrary to fact. Such regeneration is in adults a matter of a few months and, if not subject to prompt re-involvement, this recently developed lymphadenoid tissue is locally hyper-resistant and contributes to increased general resistance as well. In the presence of early recrudescence, just the reverse is true. This is the irrefutable pro-radical argument.

The other limit is presented in patients incurably affected in which, for whatever reason, palliation is indicated. These individuals have lost their regenerative capabilities to such an extent that the problem is now to obtain a sufficiently protracted *local relief* to insure physical and psychic amelioration for the remaining period of life. Extremely radical dissections are occasionally contraindicated. A decision as to what to attempt under such conditions is extremely difficult because of the impossibility of estimating the reserve powers of resistance. In spite of the higher operative mortality in this group of patients, intervention is justified since proper judgment as to treatment may gain a respite of months, even years, of hopeful life.

Between these extremes there is so large a range of therapeutic possibilities that indications for the application of surgical procedures to neck, axilla and groin must be restricted to an outline of the more dangerous gland groups and an indication of satisfactory methods of extirpating them. The distribution of lymph glands and groups of lymph glands that have been found to be subject to involvement differs somewhat from usual teachings, and although based primarily upon observations made in the study of Hodgkin's disease and allied affections, identical and occasionally even greater involvement has also been observed in both cancer and tuberculosis.

Neck. In the cervical region, the groups of greatest danger because they are most commonly neglected and are of constant and frequent involvement, are widely separated. Beginning at the upper margin, glands are found within the capsule of the submaxillary salivary gland, also above and behind that structure. Two or three glands are so constant in the lower portion of the parotid that this part of that gland should be included in all radical excisions. The mastoid lymph gland is always dangerous. A group, rather difficult of access when the mastoid muscle is retained, lies just behind its attachment and between the origin of the internal jugular vein and the trapezius muscle. Along the anterior limits,

i.e., in the midline, glands are so common from the submental group to the sternum that dissection must extend beyond this midline. This is particularly true in the suprasternal region. The fat surrounding the insertions of the sternomastoid muscles is gland-bearing and is not infrequently the pathway of extension of disease from one side of the neck to the other. Within the musculotendinous part of the lower mastoid muscle, there is a gland in a small proportion of individuals but it is sufficiently common to demand the division of the insertion of this muscle, when its removal is indicated, as close as possible to the sternum.

The posterior margin has been a site of recrudescences after supposedly radical extirpations because a group of glands lying on the external surface of the trapezius muscle at its upper third had been neglected. Likewise a chain lying behind the anterior margin of the muscle increasing in numbers toward the lower end has been overlooked with disastrous results.

The inferior boundary presents the greatest difficulties because of the necessity of blocking temporarily all lymphatic pathways leading to the mediastinum and axilla. In front of the clavicle at its inner third lymphatics connect those of the neck and upper chest and extend, at least under pathological conditions, into the axilla through the interval between the costal and clavicular portions of the pectoralis major. Behind the middle third of the clavicle is the most constant connection between neck and axilla through lymphatics lying both in front of and behind the vein. These latter are of great importance and will be discussed later. At the outer third, preclavicular extension occurs but is uncommon; still more infrequently, there is transmission between neck and axilla in the lymphatics of the fat surrounding the insertion of the pectoralis minor. Extension to the mediastinum may occur either in front of or, far more commonly, indeed almost constantly, behind the deep veins. So regular is this involvement that removal of all fat from the region behind the juncture of the subclavian and jugular veins should be a routine.

The deep lying glands in the area included within these limits are both numerous and widespread. A chain lying behind the jugular vein is constantly involved and as a rule easily removed without injuring the vein or nerves. The groups lying equally deeply but more laterally are possibly the most dangerous. They are imbedded in thick fat, especially farther outward, where a large group is constant and is connected with the axilla just posterior to the axillary vein and still farther outward and posteriorly by a chain lying in the fat on the anterior surface of the subscapularis muscle. Extirpation of this gland-bearing tissue should be done regularly even if no palpable glands are present as they can be considerably involved under such conditions.

Technically, the dissection thus indicated, extending from above the margin of the jaw to below the level of the clavicle and from beyond the midline mesially, to behind the anterior margin of the trapezius laterally, is tedious under the most favorable conditions and when the disease is extensive and adhesions dense, it becomes exceedingly difficult. Generous incisions giving wide exposure when the skin is reflected can be variously placed. One of the Bastiannelli type is the easiest to make but gives very unsatisfactory functional results when there is any tendency to cheloid or when the repair is delayed. Beginning over the base of the mastoid, cutting downward and backward an inch or more behind the margin of the trapezius, then continuing downward almost to the level of the clavicle and following the natural skin creases, thence forward to a point beyond the opposite sternoclavicular joint, will give, after a wide forward reflection of this quadrilateral flap, an abundant exposure to reach all but the submental glands. These can be secured through a small additional incision. The actual dissection is facilitated by systematic methods, which must not be too inflexible as in some individuals it is easier to excise from a direction which might be impossible in another. In general, after reflecting flaps, it is convenient to work from all margins toward the center until the eleventh nerve has been located and freed and the internal jugular exposed. The operation indicated for the

particular problem disclosed is now determined. Then, depending on whether the mastoid muscle and jugular vein can be spared, the next steps follow in natural sequence. No important structures should be sacrificed wantonly and usually patience and a sharp knife will bring surprising results. Two little procedures are helpful in extirpating these deep glands. The dislodgment of the fat from the deep triangular space between clavicle and subscapularis muscle and ribs can be started safely with a knife handle and completed with gauze, thus sparing important nerve trunks. Before removing the tissue from behind the subclavian jugular angle, it is well to have the rest of the dissection along inferior and mesial aspects completed, as there may be an anomalous vein here that is easily torn and the consequent bleeding difficult to control unless all possible access is provided. It is not always possible to avoid injuring the thoracic duct. If it is accurately sutured or ligated completely, there is no further trouble. A leak is a sorry complication. The right duct is less troublesome, but venous bleeding on this side is equally trying to control. Heat and pressure make accurate clamping possible.

These wounds should be subjected to X-ray exposures at the conclusion of operation and repeatedly thereafter. This irritation is not conducive to smooth healing, consequently a careful closure is demanded. A formation of the most complete muscle floor made possible by spreading the margins of the muscles, tacking them to each other and to available fascia, more than repays the time required by its accomplishment. The obliteration of dead spaces, the covering and protection of nerve trunks, especially the spinal accessory and hypoglossal, and the provision of a firm, smooth basis with adequate nourishment for the skin flap, really a whole thickness of graft, is thus achieved. Subcutaneous coaptation in addition to a usual skin approximation is necessary. Both should be done with interrupted stitches. The best results are obtained when no catgut is used. Dressings also play an important part in the healing. The head must be held inclined toward the shoulder of the operated side and held securely. Large dressings make possible an even, firm pressure on the whole area of operation. If drainage is indicated, small, soft rubber tubes so arranged that they may be withdrawn after twenty-four hours without removing the bandage are satisfactory. It is wise not to change dressings for two or three days, to avoid even trifling motion. These patients usually sit up by the second day and are out of bed on the third.

Axilla. At the beginning, we wish to emphasize that while the axillary dissection is the easiest of the three regions, repair is the most tedious if one attempts to save the pectoral muscles and the functional results are often less satisfactory when this is done. Moreover, a complete excision of dangerous tissue is impossible under this handicap.

The relationship of the upper margin of the axilla to extension of disease to and from the neck has already been considered. Superficially, there are in addition pathways of dissemination toward the midline anteriorly leading along the perforating branches of the internal mammary to within the thorax or more superficially still to the opposite side of the chest. In exceptional instances, glands are to be found in the attachment of the pectoralis major muscle at about the level of the fourth costal cartilage; consequently, when this muscle is excised, it should be removed as completely as possible as the lines of extension lie not only upon both surfaces of this muscle but actually within it as well as through the space between its two portions. In the deeper tissues, glands occur above the level of the veins so commonly that all the fat lying here upon and between the nerve trunks of the plexus should be removed including that about the insertion of the pectoralis minor. The most frequent line of extension in the chain of glands lying along the lower and anterior aspects of the axillary vein is not completely broken unless all the fat is removed from beneath the costoclavicular ligament. If the trunks of the external respiratory and the long thoracic nerves are located, as can be easily done by the overlying veins, then the entire mass of fat lying anteriorly to the subscapularis can be removed safely from a level well above the vein posteriorly and downward to the attachment of the latissimus dorsi and posteriorly

well back on the serratus magnus, thus cutting off more dangerous pathways toward the spine and neck. The posterior margin of the axilla shows a constant chain of glands extending on the chest wall along the anterior margin of the latissimus dorsi and also upon both its anterior and posterior aspects. The lower anterior axillary margin may lead to an extension of disease in the intra-abdominal epigastric lymph glands as well as to hepatic (Handley) involvement. The anterior axillary margin communicates under pathological conditions so freely with the opposite side as to be a constant menace. Another source of danger is the lateral segment of the female breast. Lymph glands are found in this tissue and when radical operations are done for disease not intrinsically mammillary, at least the whole outer margin of the gland should be sacrificed. Direct extension through the intercostal muscles occurs when there is advanced disease high in the axilla but only when it is so advanced that no intervention is to be considered. We contend upon these grounds that a radical extirpation for mammillary cancer to be rational must include the subcutaneous fat and superficial fascia over an area extending from above the level of the clavicle down nearly to the umbilicus, from beyond the midline anteriorly, backward well behind the anterior margin of the latissimus dorsi. Virtually all of both pectorals must be included as well as the fat above and behind the vein and backward in the hollow of the scapula. Such wounds heal splendidly and, if the cephalic vein be spared, give better functional results than when even the costal portion of the pectoralis major is saved. This statement is based upon results obtained by different methods applied to the same individual. The reduction of œdema early and late and in the period of disability of the side operated on more radically is definite and the functional result is better. Under other conditions than cancer, when less radical methods are indicated, the selection of a suitable operation is extremely difficult. If the tissues beneath the pectoralis major are sufficiently thoroughly excised to justify the intervention, the process of repair is retarded by the dead space created, no matter what plastic methods may be applied to obliterate it. The problem becomes one of balance between the dangers of reduced local resistance liable through early regional recrudescences and disability. Wound closure is along the lines indicated for the neck and usually results in prompt superficial healing; ten days or two weeks later, the deeper mischief begins to show itself. No drainage that we have been able to devise will eliminate the complication in these extensive but incomplete excisions. When the operation has been complete, i.e., a resection of all of both pectorals, drainage is frequently unnecessary and the healing is prompt, provided the radiation is not carried beyond the limits of resistance to this irritation.

Groin. The inguinal region presents comparatively little difficulty. Superficially, the dangerous gland-bearing area extends slightly above the level of a line between the anterior superior spines, below to about the junction of the upper and middle thirds of the thigh, mesially on to the abductor longus and laterally to within the line of the anterior superior spine. More deeply, it lies mainly along the femorals and iliacs, upward to the promontory of the sacrum. The only problem to be considered here is whether deep dissection is to be carried above the level of Poupart's ligament. The line of incision is of importance as upon it depends primary union of the skin. If made slightly to the middle side of the area indicated and curved convexly outward, the resultant healing is good. If made convexly inward, a slough is assured. After reflexion of the skin edges, the fat and fascia are removed down to the external oblique fascia above Poupart's and beginning an inch below the ligament the entire fascia lata is excised over the exposed area. The external cutaneous nerve and the long saphenous vein must be spared. If in addition the glands along the iliac vessels are to be removed, the fascia of the external oblique is incised as in a herniotomy, the lower margins of the internal oblique are retracted upward and the peritoneum is elevated. This may be accomplished without division of the deep epigastric vessels, though usually this division gives a better exposure. With blunt dissection, clamping resistant bands before dividing them, removal of fat

to the sacrum is accomplished with surprising ease and without shock. The very limited bleeding is easily controlled with heat and pressure. Drainage is contra-indicated. In closing this artificial hernia, it is well to imbricate the fascia of the external oblique so that the lower margin is outside and may be stitched as high as possible to get this line of sutures well above the dangerous area just below Poupart's ligament. The muscles exposed by the excision of fascia lata can be spread, dislocated, and stitched so as to cover important nerves and to make a fairly complete floor for the skin to lie upon and from which to get an early blood supply. The importance of saving the long saphenous vein lies in the fact that the redevelopment of lymphatic vessels is thereby facilitated. Individuals thus operated upon heal surprisingly well and after a few months are without œdema, even after prolonged standing. When the excision is bilateral, a trying œdema above the symphysis pubis and in the external genitalia is persistent. In these inguinal operations also it has been our experience to find the introduction of catgut a guarantee of suppuration. Skin closure should be as indicated for the neck, as the effect of the ray must also be safeguarded.

CONCLUSION

The criticism has been made so often that surgery is contra-indicated in many of these affections at any stage and in all at later stages, that we wish again to emphasize certain points in the morbid physiology concerned, which we believe to uphold the affirmative viewpoint since they have been confirmed by results obtained.

Early in these diseases, while they are limited in extent, proper surgical procedures effect a complete subtraction of the particular process concerned, as is evidenced by permanent recovery. Somewhat later. but while the resistance is still high, extirpation approximately complete may lead to the same fortunate result. Still later, operative reduction of the amount of disease, however radical it may be, will of itself promote not more than a temporary improvement. It may no longer be claimed that the treatment of these diseases, however early it may be instituted, is completed in the operating room. It has only begun there and must be continued intelligently and accurately if each individual is to receive every opportunity to recover.

This squares with the conception that certain processes are malign for certain individuals because these individuals are incapable of responding to the irritant in question with a sufficient excess of local and general resistance. While it is possible, though improbable, that some form of passive immunity may later be developed to supply this deficiency, certain it is that no form of curative vaccination has an element of justification for its use.

Progress can come only by an exact application of sound therapeutic measures in nature and in sequence dependent upon a growing knowledge of the living pathology of the disease and the morbid physiological responses it stimulates. Universal therapeutic failure and the testimony of postmortem pathology is evidence that prophylaxis and therapy have been at fault usually because antemortem pathology was neglected and not because the disease was incurable.

The philosophy expressed by W. J. Mayo[1] must come to be accepted as the basis of judgment of methods of treatment, the value of which is dependent not upon the immediate mortality rate in incipient cases, but upon the larger proportion of recoveries produced in the more advanced. Moreover, successful palliation, a material prolongation of life in hope and comfort, is perhaps as worthy an achievement as affecting a recovery and is as urgent a therapeutic obligation, not only from the patient's standpoint, but also because of the progress in treatment, that can be made in no other way.

[1] Mayo, W. J. Ann. Surg., Phila., 1916, lxiv, 304-310.

THE INDUCTION OF LABOR AT TERM[1]

A Supplemental Report

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IN these years of growth, shift and psychological change, it is much easier to rid ourselves of traditional methods and outworn shibboleths than it was in the past when environment and the unyielding bands of authority held the mind in close restraint.

It is no longer necessary to cultivate the soil as our grandfathers did, nor to refuse to employ in our medical work scientific advantages unknown to our fathers. The agriculturist of today would not permit his crops to fail from lack of rain if irrigation was available nor would the mariner leave his vessel to the fortuitous direction of wind and current for fear the utilization of his experience and scientific knowledge might be called an interference with the processes of Nature or an attempt to circumvent the intentions of Deity.

We recall the sincere but no less reactionary cry of Meigs against the assertion of Holmes that "puerperal fever is a private pestilence." Meigs was then Professor of Obstetrics at the University of Pennsylvania. He said: "I would rather believe that the fever is due to the workings of a Providence that I can understand rather than to an unknown infection of which I can form no conception." The world continues to move and it is no longer sufficient to feel that we can mark time as pensioners of Providence nor by watchful waiting evade our duties. It is increasingly evident that an obstetrician who wishes to be more than a midwife must accept responsibility, decide and act with creative energy and farsighted intelligence.

So the induction of labor must stand or fall through its acceptance by the younger men of the profession, or at least by the elastic and open-minded, who will not hesitate to assume their responsibilities and carry them through, not only with confidence but with an abundant faith in their technique and in the quality of their scientific inspiration.

They must individualize their cases, however, and be just as careful to avoid precipitant action as meticulous and vacillating delays.

At present if a child is lost through overlong detention in the womb, the fault is laid to God and no one repines; for the people are not educated to demand the termination of labor as soon as the child is mature.

If, on the contrary, forceps are used under proper conditions and definite indications and the child dies, much criticism is aroused over the unwarrantable interference of the physician.

We all know that more cases of appendicitis have been lost through timorous temporizing than by the unnecessary use, or even the abuse of the knife. So, in obstetrics, more babies are lost through overmuch reliance upon the uncertain and indifferent powers of Nature than by the intelligent and discriminating activities of a skillful attendant.

The induction of labor at term is at present practiced only by those especially interested in the solution of obstetrical problems; but the technique is simple, the judgment quickly developed and any intelligent man who is capable of doing clean surgery is competent to carry the maneuver to a satisfactory conclusion.

It is necessary, however, to consider as carefully as we may, those objections to labor induction which have suggested themselves to us in the course of our work or have been urged against it by critics both friendly and otherwise.

The possibility of delivering a premature child brought anxiety to our earlier investigations when custom and general practice gave undue importance to such subjective incidents as amenorrhœa and the date of quickening. From our hospital patients, who had only a vague recollection of the last period and none at all of the quicken-

[1] Read before the Chicago Gynecological Society, January 18, 1918. (For discussion see p. 234.)

ing, we soon learned that it was impossible as well as unnecessary to depend upon such inadequate and unscientific data.

In the Ahlfeld measurement of the babe in utero, in the McDonald maneuver for determining the size of the uterus at term and in the Perret procedure for determining the biparietal diameters of the head from the easily accessible occipitofrontals, we have a system of tests which readily preclude the induction of labor before the babe is duly prepared to combat the hardships of an extra-uterine existence.

By these examinations the maturity of the child is competently established and the history of the last period and the date of quickening are relegated at once to their proper place as merely confirmatory incidents in our calculations.

The use of these maneuvers is quickly learned, their application is easy, the results astonishingly accurate and they should be taught in the schools and as universally employed in the routine examination of the patient in the last two months as the better known pelvic measurements. For a complete description of their aims, technique, and practicability, those interested may be referred to a paper recently published by the writer in SURGERY, GYNECOLOGY AND OBSTETRICS.

The second danger and the one most dreaded is infection. However, as we showed in the report of our first series of cases, this menace is more theoretical than real where the customary asepsis is observed. This position has been abundantly confirmed by the experience of other men throughout the country who are using the method.

In none of our cases has a temperature appeared that was not demonstrably due to other agencies than the induction. In our second series we have observed no temperatures over 100.5° F. and these, four in all, were plainly attributable to breast conditions which subsided inside of twenty-four hours under the use of ice bags.

We have found every variety of microorganism in the smears made from the cervix and yet, though the induction went on, we have had no infections. This result is not to be ascribed to chance but rather to the probability that the shortening of the labor process, through the induction, has enormously conserved the vitality of the mother and her resistance. Crile has eloquently demonstrated the injurious effects of exhaustion in the cerebrum and there is no question that mental and physical depression greatly diminish the immunity of the individual. When the first stage of labor is curtailed by the bag method, the immunity is preserved and infection is extremely improbable.

We are not alone in our observation that many cases of protracted labor are followed by temperature even when conducted by clean men and with a minimum of trauma.

It is our belief that prolonged labors, though non-operative, are more disintegrating and more disastrous to the patient and more frequently followed by infections than extremely painful deliveries that are soon terminated. The human system sustains much pain for a short time far better than a less amount for a relatively long period.

Meddlesome midwifery is an alliterative charge that is loosely and almost instinctively made against the induction of labor by those who respond congenially to the trammels of tradition. Wright, of Toronto, answers this imputation quite clearly. "If," says he, "we can perform the operation in such a way that it causes no danger or at least very much less danger to the patient than the prolongation of the pregnancy involves, then we must conclude that such interference is not only justifiable but advisable."

To the man-midwife who wishes to shirk responsibility the induction of labor at term will always seem meddlesome even though it is achieved not alone without injury but also when it means a distinct advantage both to the mother and child. On the other hand by the progressive obstetrician, who does his work in a clean efficient way, it will be hailed as the same kind of conservative surgery as an early or an interim appendectomy against which the same accusation of meddlesomeness was chorused some 20 years ago.

If a surgeon of today should permit an appendiceal abscess to pursue its wayward course unhampered by directive or operative

interference, he could justly be charged with lack of training, courage, and appreciation of his professional duty if not with a negligence that borders on the criminal.

What shall be said, therefore, of the obstetrician who allows the mother to be imperiled and her babe probably sacrificed through an overgrowth of the gestational parasite when its maturity could be readily recognized and the danger safely averted by the exercise of a reasonable amount of courage and skill.

If the obstetrician is competent and aseptic in his technique, the woman and child are far safer when labor is induced at a carefully calculated maturity than when left to the watchful waiting policy of a timorous technician or to the care of a man who trusts to the decisions of an apathetic and indifferent principle of nature rather than to the more arduous and exacting activities of a discriminating human intelligence. The best apples are picked at maturity. They are not permitted to deteriorate from over-ripeness nor to be bruised by a fall to the ground through a decay of the pedicle.

Again the objection is made to our method of inducing labor with the Voorhees bag on the theory that the introduction of the bag changes the position of the head. If any one prefers another procedure such as the use of a vaginal or uterine tampon, a catheter or a Barnes bag let him work in his own way. We have no complaint. We can only report our own choice and our own results. Our statistics show that the ratio of the head positions to each other is quite close to the normal average, which would not hold true if the head were greatly disturbed. If the head should become unsettled by the insertion of the bag the event seems to be of no particular consequence, since it easily reenters the multiparous pelvis as the bag descends; while in primiparas the head is already so molded that in order to seize the path of greatest accommodation it must follow the bag down and resume its primary position.

The Voorhees bag is so flat on top that the head is not displaced or, at least, only inappreciably, if the bag rests where it should — just below the vertex.

Of course the question of technical proficiency enters into the problem. Theoretically it would be possible to push the bag in too far and by such awkwardness or lack of dexterity to convert a vertex presentation into a face or even a complete transverse, but it is not conceivable that such an event could happen where the hands are skillful and the technique of the procedure clearly envisioned.

In several instances where the head rested in an right occipito-posterior position the attempt was made to lift it, in the hope that it might come down in an right occipito-anterior; but except in two cases where the diagnosis could not be exactly defined the original conditions recurred.

The criticism is also offered by some one that the traction produced by the weight draws on the ligaments and pulls the uterus so far down that subsequent malpositions are probable.

This statement could hardly be made seriously by any one who was familiar with the pelvic conditions that precede labor. It is quite impossible to pull the uterus down unless the child descends with it and the head of the child is firmly held back by the pelvic bones. The induction of labor would be greatly simplified if the head and its muscular envelope could be brought down by traction on the bag.

Having properly given the advantage of primary presentation to the objections, let us now in justice inquire why it seems desirable to induce labor at term in the absence of pathological indications.

Medical thought at present tends toward prophylaxis as an ideal. We strive to foresee and avoid pathology if possible rather than await its onset and then contend with an accomplished fact. This reasonable prevision is called prudent prolepsis.

We must bear it clearly in mind that the commencement of labor is purely accidental, and not dependent upon any known physiological factor. It must happen, therefore, that a certain percentage of cases does not go into labor at the appropriate end of the gestation period.

Now, while it is no great disadvantage to the child for labor to occur a couple of weeks

before maturity, there is a steadily increasing danger both to mother and child for every additional week of post-maturity. The child continues to develop at the rate of a centimeter in length each week and proportionately in weight. This increase in size unnecessarily intensifies the obstetric problem and by raising the chances of operative complications greatly enhances the peril of the child and hostess. An overlarge child is the exact obstetric equivalent for a contracted pelvis whose evil possibilities are recognized. The careful supervision of the pregnancy and skillful pelvimetry will enable the obstetrician to deliver at term a six and a half or a seven and a half pound baby—a baby that would have been lost inevitably if it went two or three weeks over term and then was dragged through the pelvis of a primipara with forceps.

Some idea of the frequency of overtime babies can be gathered from von Winckel's statement that 71 per cent of babes weighing more than eight and one-half pounds are post mature. The labors in these cases are not infrequently prolonged and difficult. It is well known furthermore that many of these post mature babes die in utero before the onset of the belated labor, while the not unusual infection and mutilation of the mother bring about a protracted if not permanent disability. If this is true, as we believe, then the traditional policy of watchful waiting which was an element of safety in pre-antiseptic times now becomes an evasion of responsibility that is unjustifiable.

By a judiciously timed induction, the contractions of labor may be inaugurated when the babe is mature but not too large to pass the pelvic canal without extreme difficulty and without operative trauma; the mother is spared from four to eight hours of suffering, she rises from her confinement unexhausted and with her immunity unimpaired. A minor feature, also, but not undesirable, is the assurance that her gestation will end on a certain fixed date. This relief is usually financial as well as mental. Moreover, neither the patient nor the physician is caught unawares. There is no fire-alarm trip to the hospital at some uncanny or inconvenient hour, but with the same equanimity and control that attends any other non-accidental surgical procedure; the contractions are started in the morning, the labor advances in a cleanly surgical way and terminates in the afternoon or evening smoothly and happily for mother and babe, for family and attendants. Under such conditions of election it is easily possible and also convenient for the physician or his skilled assistant to give the patient the time and attention which all labors demand and few receive.

In brief, a scientific control of the labor from the very beginning replaces the watchful waiting of the midwife and puts the patient where she really belongs, in the domain of clean surgery.

Our choice of the Voorhees bag in our work is based on its satisfactory shape, its construction of fabric rather than rubber and its physiological effect. The bag not only initiates the pains dynamically but it acts mechanically to dilate the os and to check hæmorrhage. While the bag is in place the child is protected against injurious pressure; when it is expelled, the presenting part begins to advance and the labor is soon over.

With this lengthy but necessary preamble, the results of our second series of one hundred cases may be given, preceded, however, for the sake of those who have not happened to see our first paper by a résumé of the technique of bag introduction. We may say in passing that this technique has not been altered or amended, although one precautionary bit of advice may be offered. When the membranes are accidentally ruptured by the insertion of the bag, no attempt should be made to pull on the bag to mark its advancement lest it come out and by the suction developed bring down the cord. Let the pains expel the bag and the presenting part will follow normally and gently into the pelvis.

The patient's bowels should receive attention the night before and in the morning careful obstetric preparation is given to the external genitalia. Then under strictest asepsis a Voorhees bag is introduced without rupturing the membranes. The following technique is observed:

Assemble and sterilize by boiling 20 minutes, a Voorhees bag No. 4, a Simon speculum

or vaginal retractor, a pair of long Pean forceps, 2 pairs volsellum forceps, 1 dressing forceps, 2 pairs compression forceps, a Goodell dilator, 1 tenaculum forceps, a hand bulb syringe with glass tubes and rubber connections for the bag.

The patient, prepared as for delivery, is placed upon the table in exaggerated lithotomy position. Stirrups will serve.

The vagina is retracted, a smear made from the cervix, and the mucous membrane wiped clean with pledgets of gauze on forceps. Anæsthesia is only occasionally necessary even in primiparæ.

Before using, the apparatus must be tested by forcibly filling the bag with sterile solution.

One lip of the cervix is seized by the volsellum forceps and brought down. Usually even in primiparæ, the os is sufficiently patulous to admit the bag; if not dilate.

The bag is emptied of residual air and fluid and the flat end pulled out. It is now rolled up into a compact mass like a cigarette and seized with the Pean forceps, so that the tips extend just *to* the largest diameter of the rolled bag. Anoint the bag with sterile glycerine, turn the concavity of the forceps toward the patient's left leg, and introduce. As the bag enters, turn the mass to the operator's left — a quarter turn — so that when the operation is completed the concavity of the forceps looks upward. Release the lock on the forceps. Connect the tube with the syringe and force the sterile solution slowly into the bag. Do not overfill by force, or the bag will break. Tension on the tube of the bag or resistance to the injection of fluid are signs of fullness to the experienced operator. If uncertain of the technique, a measured amount of fluid may be used. A piston syringe of tested size will also serve to inform the operator when the capacity of the bag (6 ounces) is reached. The Pean forceps are removed as soon as the bag fills enough to prevent its slipping out. Remove volsellum. Tie tube with tape when the bag is full and disconnect the syringe. Put a sterile pad on either side of the tube. Remove the stirrups and straighten out the patient in bed. If the bag breaks, or being insufficiently filled is expelled within an hour the pains will sometimes go on without further irritation of the cervix; if they do not, another bag should be introduced.

If the pains do not start within an hour, or if compression is desired as in placenta prævia, or a more rapid dilatation, then a weight of one or at most two pounds is attached by a tape to the protruding tube and passed over foot of the bed. Usually in from five minutes to half an hour contractions begin and labor has been inaugurated just as one would start the pendulum of a clock.

In a variable period, rarely more than four hours — three hours and nineteen minutes was the average in this series — the bag is expelled by strong pains, the dilatation is practically complete, the head follows the bag down, the membranes rupture, and the second stage begins. From now on the case is managed according to general obstetrical principles. If the pains are weak and shallow, pituitrin may be indicated; if strong and regular, morphine and scopolomine or gas or chloroform may be added. The tedious, exhausting and painful first stage has been materially shortened and definitely controlled. The bag acts as a dynamic stimulant to the contractions as well as a mechanical aid to cervical dilatation, and it preserves the membranes from injurious pressure until physiological rupture occurs. If the membranes have been ruptured when the bag was inserted, it is good practice to make an internal examination when the bag is expelled to determine the presence or absence of a prolapsed cord. It has a good effect also to lift the weight at half hour intervals and observe the effect on the pains.

In the present series there were:

Primiparæ 51, multiparæ 49. The average duration of labor was 8 hours and 8 minutes. This figure is greater by 53 minutes than the average in the first series, but it may possibly be accounted for by the presence of 16 more primiparæ in this series.

The longest labor was 28 hours; the shortest, one hour. The shortest labor in a primipara was 1 hour and 25 minutes.

The bag broke during or shortly after insertion, three times; but it was re-inserted only once. The membranes were ruptured by the introduction of the bag five times. In one case of hydramnios it was intentional.

There were no maternal deaths.

The average weight of the babes was 7 pounds and 2 ounces not including two pairs of twins which averaged 5 pounds and 2 ounces. Among the babes were 57 boys and 45 girls. Five babies died. Two were bleeders and died on the second and fourth days respectively. A third developed toxæmia on the seventh day and died on the tenth. Two were stillborn. One of these was a normal spontaneous delivery and the other instrumental. The head was on the perineum when the heart tones grew weak. The forceps were quickly applied in vain.

The positions were: left occipito-anterior, 58; right occipito-anterior, 16; right occipito-posterior, 21; breech, 16; total 102 (two pairs of twins).

Forceps were used 16 times, to hasten labor 3, deep transverse arrest 7, uterine inertia 4, occipito-posterior 2; version and extraction was done twice, once to expedite labor in a heart case and once for prolapsed cord.

The average time for the expulsion of the bag was 3 hours and 19 minutes, as compared with 3 hours and 20 minutes in the previous series. The longest detention of the bag in the cervix was 9 hours, the shortest 10 minutes.

Pituitrin was used in 41 cases. Episiotomy was done 10 times. Tears of second degree or less occurred 12 times. Rigid os, that *bête noir* of obstetrics, occurred three times and the labors lasted 28¼, 18½, and 18¾ hours respectively in these cases. All were primiparæ.

In all cases but two, weights were applied after the introduction of the bag, the traction being just sufficient to keep up a mild pressure on the cervix.

In no instance was it necessary to dilate the os before inserting the bag.

Five cases required a few whiffs of chloroform during the introduction of the bag to control nervousness rather than actual pain.

Involution was normal in all cases.

In this second series, it is extremely gratifying to report that the favorable opinion of the method which was formed during the first series is not only confirmed but strengthened. No objections to the method have been raised hitherto that can be validly sustained among scientific men.

Our observations up to this time lead us to believe that the bag can be used freely and harmlessly both in primiparæ and multiparæ and in normal as well as in pathological cases. It removes and overcomes the principal obstacle in a majority of labors — the undilated cervix — and leaves us only the bony pelvis as an obstruction and this, too, in a patient whose strength is as yet unreduced and a babe of reasonable size.

The most difficult cases we have to contend with are the multiparæ with much cicatricial tissue in the cervix and primiparæ where the same part is thick and hard. These are intractable conditions under any circumstances and it is probable that our experience in the future will show that such women have far more satisfactory labors with the bag than without it. Moreover, these cases are close to pathology and should be considered separately, in the class with contracted pelves.

As we said in our first report, the highest advantage of our procedure lies in the fact that the course of labor is entirely under the control of the obstetrician from start to finish. There is no timidity, indolence or dubiety. The day is appointed; the cervix is dilated slowly or quickly; the contractions are strengthened or weakened; the pelvis is enlarged or let alone; complications are boldly met or foreseen and avoided; the labor is hastened or prolonged; the pain is permitted, diminished or abolished according to the judgment of the operator. The process works in strict harmony with the principles of modern scientific surgery.

THE PROBLEM OF THE RECONSTRUCTION AND RE-EDUCATION OF THE DISABLED SOLDIER[1]

By Major ROBERT W. LOVETT, M.R.C., U.S.A.

APPROXIMATELY a year ago the United States entered the European War. During that year hundreds of thousands of young men have left their homes, their people and their occupations and have entered the service of the United States to fight its battles. These men were not only in the most active and vigorous period of life, but having been examined for physical soundness before entering the army, they represent a highly selected class of sound, active individuals of great value to the community.

The experience of Canada has shown that out of every million men sent overseas, 100,000 or 10 per cent, will have, within one year, been sent home as unfit for further military service. Of the 100,000 thus sent home, 80,000 will be able in most instances to return to their former occupations. The other 20,000 will have been so badly disabled that they cannot return to their former trade or occupation and must be partly or wholly re-educated to some new one.

The governments at war recognize their responsibility to return these men to civil life in as nearly as possible the same condition as that in which they were taken from it. It may be possible to return them on a higher level of economic value or it may be on a lower level, but it has been definitely established that each government concerned will do its utmost to restore to each disabled man the highest degree of economic efficiency attainable, not as an act of charity but as a discharge of a legitimate indebtedness. The present address deals with the means by which this is to be accomplished.

The problem concerns the public in two ways. First, there are few homes where some near or distant relative or friend is not or will not be in the service and, second, the success of the movement to be described here must depend finally upon sound public sentiment and the education of the public to an appreciation of the character and gravity of the problem to be met. For this reason before discussing the specific question of ways and means, something must be said of the proper attitude of the public toward these returned disabled men. Those soldiers who return without an arm or a leg or with a disabled or useless limb are not to be regarded as poor cripples to be commiserated and set apart as unfortunates whose usefulness is ended. They will not in the future be compelled or allowed to sell lead pencils or boot laces on the street corners as their most suitable occupation. They are rather to be regarded as public spirited citizens who have incurred some physical disability in the pursuit of their service to their country, a disability to be regarded as a badge of honor rather than as a physical defect. This disability in most cases can be, in greater or less measure, compensated for by proper treatment and training, and in many instances the disabled man will find himself in a position to earn better wages than ever before in his life. To substantiate this somewhat optimistic point of view, one may quote briefly French and German experience.

The loss of an arm of course constitutes a more serious problem industrially than the loss of a leg. At the school at Lyons, toy-making and parts of bookbinding are taught to one armed men. At Montpellier, wood turning, tailoring and boot making also proved available. Of other occupations for such men are basket work, drawing, horticulture, telegraphy, clerical work, stenography, etc.

With regard to the loss of a leg, the experience of the English Soldiers and Sailors Help Society is of importance. They consider "that the loss of one leg does not debar a man from being quite as useful as he would be with two legs, provided a little care is taken with him in the early stages; and we consider that if we were to take two men, the one having all his limbs and the other minus a leg, we should

[1] Fourth Mellon Lecture delivered before the Society of Biological Research of the University of Pittsburgh, May 10, 1918.

be more successful with the man minus a leg than with the able bodied one, for this reason, that the man with one leg realizes that he is not quite so useful as the other man and therefore lays himself out to be as useful as he can possibly manage to be. We can arrange suitable work for men who have lost both legs: it is only a matter of getting a man onto his bench or into his chair each morning."[1]

The attitude of regarding these disabled men as in any way objects of charity is wholly improper and unjust and should be condemned. They have earned the right to every care, every privilege, and every assistance that we can give them. They have fought our battles at the front during the war and we should regard it as our privilege to fight theirs at home after it. Nor should there be too large an element of sentimentality and emotion in dealing with the problems mentioned. Heroes these men are, but they will be better served in the end if the public regards them rather as men whose wage earning capacity has been impaired, men to whom it is due that every effort be made to make this diminution as little as possible.

"In one of the allied countries the wife of a returned soldier complained to the representative of a patriotic relief agency, which had been attending to the family needs while the chief breadwinner was at the front, that her husband would never spend any time with her or the children. She had wanted that afternoon to have him accompany them to the park but he disdainfully refused, saying that he was going out for an automobile ride and later to a 'sing song' at one of the fashionable hotels. The musical entertainment referred to was being provided by the society ladies of the city."[2]

This problem of the attitude of the public and of educating it to better things is of very great importance because the cripple of the past has been regarded askance, as a poor unfortunate, greatly to be pitied, to be stared at in public and petted and spoiled in private. This attitude is well presented in a novel which was in vogue some years ago called *Sir Richard Calmady* by Lucas Malet, where the crippled hero's disability and peculiarities are harped on and discussed, dwelt on at every turn and his life is centered around his peculiarity, which is constantly emphasized by all those about him. So well does it embody all that we ought to condemn that I have often asked classes of medical students to read the book in order to learn what attitude to avoid.

Take rather as a model of what is desirable, the attitude of a young woman of twenty-six who appeared at a recent orthopedic clinic held in connection with the Army Medical School in Washington, whose story only came out when she was questioned in the amphitheatre. She had been injured in an automobile accident six years ago when an overturned car had pinned her beneath and had fractured her spine. An unsuccessful operation had been performed and since the day of her accident she had been wholly paralyzed from the waist down. For the first year she had been treated, but for five years nothing had been attempted. With casters put onto an ordinary kitchen chair she had managed to do the housework for a family of five. She had done the cooking, made beds, swept, scrubbed, cleaned paint, washed windows, done some gardening and had so far as I could learn done all these things without a thought of commiserating herself or asking for sympathy or assistance. Some friend had insisted on her coming to the clinic. Contrast this healthy minded attitude with the morbid, shrinking, self-indulgent, self-conscious attitude so often possessed by the cripple, and see what a great advantage there is in inducing people to adopt the healthy and sane, rather than the morbid and commiserating, view toward these returning soldiers.

So strongly do I feel the disadvantage of dwelling too much on the term cripple that in this address it will be my attempt to avoid the term "crippled soldier," so much in vogue in the newspapers, and to speak only of the disabled soldier.

Having thus considered the spirit in which the matter should be approached, we may come to the closer consideration of the problem itself. The term most often applied to

[1] Hutt. Am. J. Care of Cripples, 1917, June.
[2] McMurtrie. The War Cripple. Col. War Papers, Ser. 1, No. 17.

meet the situation, and perhaps the best, is *Reconstruction*. The word reconstruction is also applied to the repair of the devastated regions in France and Belgium, such as the rebuilding of villages, the refurnishing of farms and houses, the replanting of orchards, etc., which activity is perhaps equally entitled to the use of the word reconstruction, but this double use leads to confusion and confusion will in the end prove detrimental rather than beneficial to both interests.

In this instance the term reconstruction will be used to designate the attempt to rehabilitate and if necessary re-educate the man who has been physically disabled. This attempt will fall into three divisions which are almost self-evident. First, the returned soldier must receive medical and surgical attention to determine whether he needs further operation and if he does, he must have it performed. Second, many of the men with surgical injuries require treatment to loosen up joints, develop muscles, free tendons, improve resistance to fatigue, and although this is partly accomplished by massage and similar measures, it has been found in this war that it is better brought about, when possible, by actual work either in bed, *bedside occupations*, or in shops equipped for the purpose known as *curative workshops* in which an occupation is pursued which is of itself curative. Third, the disabled man must in a certain number of instances be educated to a new trade or occupation inasmuch as he may be unable to follow his original one on account of the nature of his injury, and here comes in the third stage of reconstruction activity spoken of as "vocational training" or "re-education."

The stages of reconstruction may be tabulated as follows:

Reconstruction	Medical or surgical attention	
	Therapeutic measures	curative workshops massage, gymnastics, etc.
	Vocational training	placement and follow up

The whole question of reconstruction in this paper will be discussed largely from the point of view of the orthopedic surgeon, not because it is the only point of view but because it is the one with which the writer is most familiar.

Care of cripples. At the beginning of the war in 1914 most of what we knew about the possibility of restoring usefulness to the disabled, we had learned from our attempts to help the cripple, or the crippled child whose functions had been impaired by disease or accident or by some congenital defect. Industrial schools and homes for cripples had been founded, societies in Germany and America had been formed for the study of the question and two journals, one German and one American, were devoted to the consideration of the subject. Up to 1832 the cripple had been wholly neglected as a public problem but in that year the Royal Bavarian School and Home for Cripples was started. America took no effective action in the matter until some sixty years later when a private educational and industrial school for cripples was started in Boston. That was in 1893 and represented the first American attempt at re-education along useful lines although there had been founded three homes for crippled children in the preceding few years.

When it came to convincing the public that the state care and education of cripples was advisable, necessary and economical, it was surprising to see what public inertia one encountered. The blind, the feeble-minded and the deaf mutes were recognized as proper subjects for state aid and instruction, but to one who was concerned in an attempt to convince the Massachusetts legislature that cripples were entitled to similar advantages, the unwillingness to take seriously the question was surprising, but although in the end the fight was won, only four states have provided such state care and education. Minnesota, New York, Nebraska and Massachusetts founded such schools in the order named between 1897 and 1906 inclusive.

Industrial cripples. The care and rehabilitation of the man crippled in industrial work was never considered in America a public problem and he has been from the outset neglected, and a great economic error has thereby been committed. However, that will never occur in the future for the lesson of what may be done in restoring the disabled soldier to usefulness is already being taken seriously in the industrial world in its applica-

tion to those injured in the industries, a matter which will be discussed later.

Taking the situation as it existed in 1914, we had learned from this study of the attempt to improve the cripple that his mentality and outlook were unfavorably influenced by his disability, that he was uneducated, in a surprisingly large proportion of cases being wholly illiterate, that trades and wage earning occupations were often closed to him in his uneducated condition, but that in many instances by proper surgical attention, by general education and by special training, he could be made a wage earner and a useful citizen instead of being a burden on his family or becoming an almshouse charge. The patient with paralyzed legs and consequent inability to get about actively is just as useful as anyone else as a typesetter, leather worker, or a designer. A girl with paralysis of both arms in the Massachusetts Hospital School at Canton, Massachusetts, was taught to use her feet as hands and in a sewing competition among the town pupils won first prize for her sewing and embroidery. A baseball nine was formed at this school and in a series of games in one of the school leagues one summer, this team won two games out of every three played in competition with healthy boys of their own age. The catcher had two artificial legs and his base running was done for him by a boy with useless arms but good legs. Thus through the nine the job was adapted to the disability of the individual. We had learned that the individual within proper limits could, to a large extent, be educated on new lines and that, to a certain extent, the job could be adapted to the individual.

In England an attempt to salvage disabled soldiers was begun after the Boer war and workshops were established by the Incorporated Soldiers and Sailors Help Society in London which after the death of Lord Roberts were called the Lord Roberts Memorial Workshops. The object of these shops was "to teach useful trades to men discharged as medically unfit who, by reason of their disability . . . are unable to take ordinary employment and to make such cases as far as possible self supporting."

There should be added to the knowledge existing in 1914 derived from the study of the cripple and from the experience of England just mentioned, a small amount of information from a few schools for those injured in industry, such as that at Charleroi under M. Baséque, who put this experience into use in the École Joffre in Lyons.[1]

With this stock of knowledge, England, France, and Belgium started in soon after the beginning of the war applying the facts thus learned to the repair and re-education of the disabled soldier. This attempt has been attended by very marvelous results and in this country we start in with the great advantage of being able to draw on the experience of these nations in meeting a problem similar to the one that now confronts us. The data here presented are necessarily derived from the experience of these other nations.

The keynote to the whole situation seems to be that man is an adaptable animal, mentally and physically, that in his daily routine he is probably using but a small part of his real capabilities, that his life occupation is not necessarily the one for which he is best fitted and that he is often not educated up to his regular job. If, therefore, a man is so injured that he cannot return to his old work, the question arises as to what work he is physically and mentally fitted to perform and among such jobs, which one attracts him. Moreover, a little education might help him to a better job within limits than he had before. We can count on adaptability as enabling the intelligent man to adapt himself to his work, so that the work need not wholly depend on being adapted to the man.

Progress of the soldier. To take up now the specific problem to be discussed, we must start with the soldier's injury. The man who is wounded in action receives his first surgical attention from the regimental or battalion surgeon at the first aid post, generally situated in a dugout a few hundred feet behind the first line trench. Conditions are not favorable at this place for more than first aid. He then either walks or is carried through the communicating trenches to a point about a mile back where he is placed in a motor ambulance and carried to the field ambulance dressing

[1] Hannan. Contemporary Review, 1916, p. 105.

station about three miles back of the front line trench. Here he receives an inoculation against tetanus, his wound is redressed, he is given a hot meal and is carried on in a motor about five miles farther to the casualty clearing station. Here he receives his chief surgical attention, he is X-rayed if necessary, operated on if need be, perhaps redressed, put in bed, nursed, fed, and cared for until he is able to be transported by train to the base hospital, a journey of some hours; and in this base hospital he can be kept as long as need be. In general it has not been found advisable in Canadian experience to keep a man in Europe over three months. A man obviously permanently disabled is generally returned home in about two months, while doubtful cases are retained about three months to see if they are likely to be able to return to active military service. From the base hospital he either returns to the front, after perhaps a stay in some convalescent home, or he is invalided home as probably or manifestly unfit for further active war service.

With regard to the number of men who are returned to the front for active service from the base hospitals in the year ending April, 1915, the Germans claimed from 87 to 91 per cent. Data made early in 1917 by a Copenhagen society give for the central powers and allies about 70 per cent to be returned to the front. It is stated in a military periodical[1] that in the battle of the Somme there were some 2600 wounded British each day of whom 85 per cent returned to active duty. Well informed authorities regard the German claims as quite exaggerated while others would place the figure at 80 per cent or higher on the Western front for both allies and central powers.[2] The fact is that there are as yet no reliable data available on which to base an exact estimate but there is no great doubt that more than half of the wounded who reach a base hospital are capable of returning to duty in a few weeks. An English estimate[3] gives the following percentages: In the so-called command depot at Heaton Park within a period of six months from the date of injury about 50 per cent rejoined their original units, 15 per cent were sent to service in communicating lines abroad, 15 per cent were useful for sedentary occupations at home and somewhat over 20 per cent were discharged as permanently unfit, many of these having been untreatable from the outset. Of the men thus invalided home, Belgian experience has shown that 80 per cent are capable of vocational re-education, while 20 per cent must be regarded as permanently incapacitated for wage earning activity on account of the nature of their injuries. Of those who are suitable for re-education, 45 per cent can be made to earn their normal wages, 20 per cent can be partially restored and can earn an appreciable wage, while 15 per cent can be repaired to an extent to earn a salary which will constitute a bare livelihood.

Method. On the arrival of the soldier at a home port, he is either discharged permanently to his home after examination or is sent to a reconstruction hospital, after a short furlough at home, which has been found desirable when it is practicable and the soldier is able to travel. This conduces to a better mental attitude and greater content. The men discharged permanently are those who are unfit for further military service and who are not in need of further surgical or therapeutic attention, most of whom are able to pursue their former lines of work without re-education.

Of the returned men, 75 to 85 per cent are to be classed as orthopedic. The definition of orthopedic as established by the ruling of the Surgeon General of the United States, of August, 1917, a ruling which is in general accord with the English and Canadian classification, is as follows: (a) derangements and disabilities of joints including ankylosis; (b) deformities and disabilities of feet; (c) malunited and ununited fractures; (d) injuries to ligaments, muscles and tendons; (e) cases requiring tendon transplantation or other treatment for irreparable destruction of nerves; (f) nerve injuries accompanied by fractures or stiffness of joints; (g) cases requiring surgical appliances.

With regard to the various forms of affections which have disabled these men, an analysis of about 3000 Canadian returned men

[1] Military Surgeon, 1916, Dec.
[2] Rubinow. Red Cross Inst. for Disabled Men, Bulletin No. 4.
[3] Mackenzie. Brit. M. J., 1916, August 12.

was made in 1915 with the following percentages, which may be taken as indicating about what we may expect:

	Per cent
Major amputations	13.9
Other permanent injuries to extremities	26.7
Other injuries and wounds	12.2
Eyesight and deafness cases	13
Di eases of chest and heart and rheumatism	23.8
Nervous diseases	4.7
Miscellaneous disabilities	5.7

Generalizing from these figures Rubinow[1] estimates that in an army of one million, operating for a year, some 40,000 men may be expected to be disabled through serious injuries to their extremities and therefore to require special placement facilities or vocational re-education. An estimate of the probable character and distribution of these injuries is as follows:

Amputation of leg	7,100
Amputation of arm	5,800
Amputation of hand	700
Injuries to leg not requiring amputation	9,500
Injuries to arm not requiring amputation	9,100
Injuries to hand requiring partial or no amputation	7,800
	40,000

Relation of soldier to military establishment. The first serious question which arises at this point is, What shall be the relation of the returned disabled soldier to the military establishment? Shall he remain under military discipline or shall he be discharged? If he requires no further treatment and can return to his former occupation he can obviously be discharged. If he requires further treatment it is the general opinion that he should remain in the army and under military discipline until such treatment is nearly or wholly completed. If after his treatment or toward the close of it, he requires re-education or vocational training for a new occupation there are divergent views as to whether he should receive this from military or civil sources.

It is urged in favor of civilian control, (1) that private control is free from embarrassing limitations due to legislation; (2) that the services of experts would be available who are not available for government service; (3) that the use of private funds would be obtained; (4) that diverse civilian agencies now in existence could be utilized. In favor of government control it is said that (1) the government has charge of the soldiers when they return and is under the immediate need of providing for them; (2) experience has shown that soldiers so far as possible should be rehabilitated in their own communities and that this geographical distribution can most easily be carried out by the government; (3) if military control during re-education is necessary, the government alone can exercise that; (4) the training of teachers for the work should be carried on by the government; (5) the government is in a position to utilize agencies which civilian control could not command; (6) the governmental better than any other control, could command co-operation in placing these men in positions after their rehabilitation is finished; (7) private control implies that these men are wards of charity rather than the recipients of their just dues and the continuance of private support is precarious.

Re-education is practically obligatory in Germany, Austria, Italy, and Belgium, although even in these countries they are unable to persuade a certain percentage of disabled soldiers to undergo re-education. In France the whole matter is in charge of an interministereal commission called the French National Office. The training offered is not obligatory in the strictest sense because honorable discharge may be granted before the course of training is complete and after this the wounded man is free to do as he pleases. "Undoubtedly some means will have to be found by which re-education can be made to hold a greater appeal to disabled men." [2] Facilities for re-education are unequal to the demands, inasmuch as France can only provide for 7000 to 8000 men each year and there are approximately 300,000 war disabled to date. In Great Britain when men are discharged from the service, they are referred to a local committee. Training is not compulsory but it is the duty of the local committee to urge it upon disabled men. Treatment will be provided at the state's

[1] Rubinow. Red Cross Inst. for Crippled and Disabled Men. 1918, Feb., Ser. 1, No. 14.

[2] War Dept. Office of the Surgeon General. Bulletin No. 3

expense even after discharge. If he refuses training half of his pension may be withheld. During training he is paid as if he were totally disabled and his family receives the same allowance that they would if he were dead.[1]

It would seem as if uniformity of conditions in treatment and re-education were better insured by government control as the soldier is then in the hands of specialists controlled by the medical department, he is associated with other men similarly handicapped and his tendency to self commiseration is thereby diminished and he is far less likely to mental demoralization than if he were turned loose to be cared for by private charity administered in civilian institutions.

The advantage of standardization of morale and methods is great and this would imply that if government control of these men is to exist they must be treated in military hospitals, and that civilian institutions could not be used unless wholly turned over to the government for the purpose, because the utilization of civilian institutions would mean civilian control of men in service or a divided control. The possibility of the former can perhaps be only appreciated by those who have seen the returned men under these conditions. After months or years of hard exacting work, they find themselves idle and disabled with their future to a certain extent unsettled. They resent the idleness, they are inclined to be mentally unstable and unruly, and at no time in their career do they need a firmer hand than during their early convalescence. A civilian institution filled with such patients would be a constant state of ferment, unrest and inefficiency. With regard to dual control of such institutions, that was tried out in Canada where the hospital's commission, a civilian board, and the medical corps shared equally in the control of the reconstruction hospitals. The disadvantages of the scheme were such in the way of duplication of all administrative machinery, that after one or two changes a scheme has recently been adopted by which the whole matter has been placed in the hands of a new department of the Government of Canada known as the Department of Soldiers' Civil Re-establishment over which a Minister of Soldiers' Civil Re-establishment presides. The duties of the department comprise the providing of hospitals, convalescent homes, and sanatoria; the vocational education and other training, and all matters relating to pensions of disabled soldiers.

Civilian institutions are naturally anxious to be of use and much pressure has been brought to bear on the government to use such institutions, but it would seem that the best results were to be obtained if returned disabled soldiers remain in the army and are not discharged until their treatment has been nearly or wholly completed, and that this should be carried on in military institutions under military control, so far as proves practicable. It will often happen that the man's treatment and vocational training must go on contemporaneously. His status under these conditions will have to be determined in each individual case, but the weight of opinion is to the effect that treatment will be more effective when carried out under military control.

To return to the program of the individual soldier. At the conclusion of his furlough or if no furlough is practicable, the returned disabled soldier is sent to a reconstruction hospital, and it is important that idleness should be terminated as soon as may be. Here he is carefully examined, his disability investigated, and analyzed, his needs formulated, the question of an operation to improve his defect considered and if necessary performed. After this the question of his treatment is considered. If he requires an artificial limb, his stump is prepared for its application. Very often the joint of the hip, for example, has become stiffened in a position which makes it difficult or impossible to use an artificial leg.

The artificial limb question has been settled by Canada, by the establishment of artificial limb factories administered by the Government, where such appliances may be turned out of standard pattern at a cost much less than that asked by the commercial manufacturers. These limbs are fitted under the supervision of the surgeon and the patient instructed in their use.

[1] Faries. Magazine for Care of Cripples, 1918, March.

If stiffened joints exist, the question of their mobilization arises by operation or therapeutic means. Paralysis is analyzed and the possibility of the restoration of some degree of nerve power discussed. Ulcers from wounds, badly united and ununited fractures and similar disabilities are placed under proper treatment and operated on if need be.

Before discussing the strictly medical and surgical aspect of the treatment, something more must be said of the psychology of the disabled soldier. He has been living under discipline, under great stress and excitement at times, he has been under orders and has not had to think for himself when, suddenly he finds himself partially or wholly disabled, his former occupation can perhaps no longer be carried on, he has a family dependent on him and his future is uncertain, he is inactive and perhaps has to remain in bed for weeks. He must not be classed with the ordinary hospital patient; he has special needs, he may be unable to read or not interested in being read to, while for games or cards he may have no aptitude, yet he must be given some occupation, and here comes in the usefulness of the so-called *bedside occupation* which should be begun as early in his career as possible.

The so-called bedside aides, here find their usefulness in teaching simple and useful occupations to these men. The teachers themselves w'll have to be trained in many or most instances, but it takes a short time to learn enough of basket making, knitting, block printing, weaving (hand looms and bead looms), etc., to teach a man who does not know the first rudiments of such things. In this line of work comes the first introduction to vocational training and it serves a useful purpose in occupying the man in the manufacture of something which can be used by somebody and immediate improvement in morale is often noticed.

The attitude which the public should take toward these men has already been spoken of but not less important is the attitude which such a man should take toward himself. Self pity is demoralizing and detrimental; courage and self-reliance and sanity cannot be taught by lectures but in the helpful stimulating attitude of those who come into contact with these men in the early days of their reconstruction. Such help should begin as far back as the base hospital where the mental needs of the soldier should be met, and occupation if possible provided. During the voyage he should have some such cheerful companionship and occupational therapy should be at hand to prevent mental demoralization.

PHYSICAL THERAPEUTICS

The therapeutic measures at our disposal which have proved useful in such injuries in civil life in the past and have shown their value in war conditions are as follows:

1. *Massage* is used to restore tone to the muscles, stimulate local circulation, to loosen up scars and diminish swelling, and for this need we must educate competent operators. It is responsible business and not to be handed over to every person in civil life who calls himself a masseur. A school must be established for the training of competent operators, a standard of excellence must be decided upon and the soldier must be protected against careless and perhaps harmful manipulation.

2. Medical or therapeutic *gymnastics* must be given with a purpose of improving the general condition, of increasing resistance to fatigue, of loosening up stiffened joints, of improving the strength of weakened or paralyzed muscles, etc. They have been long recognized as effective and in war conditions have proved of the greatest value. They must, however, be given with care, skill and judgment by competent operators.

3. *Mechanotherapy.* Another department of physical therapeutics would consist of what would be called mechanotherapy, used chiefly for the mobilization of stiffened joints and development of weak muscles where machines of greater or less complexity are used instead of manual stretching and manipulation. The pendulum principle has been extensively used, the rhythmical swing and graduated force being effective. Simple apparatus is devised by certain men to suit their own needs[1] and complicated ones are of the type of the Zander apparatus.

4. *Hydrotherapy.* In physical therapeutics would be included hydrotherapy or water

[1] Mackenzie. Brit. M. J., 1916, Aug. 12.

treatment by baths, douches, sprays, etc., which are of use in promoting local or general circulation, removing local congestion and thickening, and stimulating the general condition.

5. *Electricity.* Treatment by electricity or electrotherapeutics has shown itself to be of value in nerve injuries, local muscular weakness, or paralysis and similar conditions.

6. *Heat.* The use of hot air and radiant heat from gas-heated ovens and from electric light bulbs has long been known to reduce local congestion and swelling, to allay local pain and tenderness, and to diminish, along with the other measures mentioned, joint stiffness.

7. *Games.* There may be grouped in this division of physical therapy the use of games, fencing, bowling and similar exercises to improve the general condition and to mobilize partly stiffened joints.

8. *Muscular re-education.* Muscular re-education or functional re-education of the physical therapeutic measures is the last to be considered. Here the attempt is made to teach muscles to resume their normal functions, wholly or partly lost by injury, or by so-called shell shock. Long recognized as of value in the treatment of paralysis it has assumed especial importance in the treatment of the returned soldier and has been particularly elaborated and formulated by Prof. E. A. Bott of the University of Toronto.[1]

Curative workshops. The value of the measures mentioned under physical therapy cannot be overestimated and have been demonstrated as never before in the case of the disabled soldier, but these measures possess the disadvantage of monotony, they have no definite use beyond the improvement of the individual, and carried out over a long period the soldier loses interest and becomes stale. The tendency has therefore of late arisen to substitute for them some occupation by the performance of which some of the same aims may be accomplished, and this introduces the question of the curative workshop which has assumed great importance. The introduction to the curative workshop has been offered to many of the soldiers by a preliminary use of bedside occupation. The curative workshop represents the most important and the newest feature of the second phase of reconstruction. You will remember that the first phase concerned itself with surgical repair by operation or treatment or both. The second phase opened with bedside occupation already described to which succeeds the curative workshop, which completes the second phase. The third stage, not yet taken up, deals with vocational training. These stages overlap and are naturally not wholly distinct. They are repeated here in the hope of making a new and rather complicated matter a little plainer.

Sir Alfred Keogh, K.C.B., formerly Director General of the British Army Medical Service speaks of the curative workshop as follows:[2] "Nothing has been more remarkable than the overthrow of the old-fashioned purposeless orthopedic exercises for the cure of muscle weakness, stiff joints, etc. Under the influence of Colonel Sir Robert Jones, C.B., useful manual work has largely supplanted the older system of mechanotherapy. The bench, the workshop, and the gymnasium provide for the active movements of joints and of limbs, in contradistinction to the, for the most part, passive movements of the appliances hitherto in use, while at the same time the patient, being provided with a useful occupation, lends himself more readily to the treatment prescribed for him and becomes interested in it. The chief point to remember is that each piece of work performed is a prescription ordered by the surgeon for a specific joint or muscle disability."

Colonel Sir Robert Jones, Inspector of Military Orthopedics, who is in large measure responsible for the development of the curative workshops says: "As soon as the patient is fit to get about he should have some occupation both for his mental, moral and physical welfare. Here the curative workshop is an invaluable aid to his gymnastic treatment. . . . Excellent and useful as systematic gymnastic training is for developing movement, the training in co-ordination in doing purposeful work is what really brings brain

[1] Univ. Toronto Monthly, 1917, April.

[2] Bulletin No. 6. Federal Board for Vocational Education, 1918, Feb., p. 46.

and muscle once more into proper accord, while regular daily work re-establishes in the patient habits of responsibility and self respect . . . for example a man with stiff fingers barely able to grasp even fairly large objects, is soon utterly wearied if set to grasp spring dumb bells or any other such apparatus, but will cheerfully spend the morning grasping a big duster and cleaning windows. . . . Later if he is a carpenter or other skilled tradesman, he is promoted to the use of tools he understands, and so the disabled is re-educated partly by set gymnastic exercises and largely by work. Driving a plane in the carpenter's work can be employed for exercising muscles and joints in both arms and legs. . . . His brain is interested in what his hands are doing and not wearied by the curative action which the trade brings about."

In the choice of the special department of the curative workshop to which the man shall be first assigned depends almost wholly on the therapeutic needs of that man. It may be that he requires only occupation for his general physical and mental condition to enable him to resist fatigue better, to improve his circulation and muscle tone. For such men it matters little which of the divisions of the work they take up, but in general it is obviously desirable for them to take up some occupation which would be preliminary and introductory to their vocational training. If the man, on the other hand, has stiff joints or shortened muscles, then his assignment in the curative workshop must be made with much care. The most common trades used in such shops are carpentry, metal work, the use of lathes, leather work, cobbling, tailoring, net making, basket making, drafting, etc.

In cases where the curative workshop is used mainly for loosening up joints and muscles the application would be much as follows: If the wrist is stiff and the circulation of the hand poor, the use of a carpenter's plane is prescribed which will necessitate the use of both fingers and hands. The stroke at first will be short but as it is lengthened it exercises more effect upon both wrist and fingers. If pronation and supination are limited the board to be planed may be slanted more and more which exercises a new line of force. If the elbow is stiff the patient starts using a saw with a short blade and the length of the saw and the length of the stroke are gradually increased to exercise more force upon the stiff elbow. Other carpenter's tools of use for their corrective effect on arm and hand are the gimlet or screwdriver, the bit stock, etc. Basket work and net making are excellent for loosening up stiff fingers. For stiff ankles and knees, pedal driven fret saws, foot lathes or foot-driven machines of almost any nature mobilize the joints of the lower extremity. In the curative workshop, utilized only as such, there need be very few trades, carpentry being the most generally applicable and the material output is not important because the main object is therapeutic. The curative workshop is situated in the reconstruction hospital and is more closely affiliated to the medical than to the vocational aspect of the work, because its use is to replace and supplement such measures as massage, etc., which would naturally come into the medical division. In general the medical division of the work would run through the curative workshop, and in the period of vocational training the vocational adviser would be in charge. But there must needs be overlapping, and the vocational trainer would probably have the technical administration of the curative workshop to carry out the prescriptions of the medical officer. The medical officer would naturally be consulted as to the man's capacity for one or another form of vocational training. In this overlapping would be found common ground for both medical and vocational experts.

As to the size of the problem of vocational re-education, the estimates of the Federal Board of Vocational Training in their report of February, 1918, are as follows: "The latest report of Canadian experience states that practically 10 per cent of the Canadian forces overseas have been returned as unfit for military service. . . . Of the men returned unfit for military service 80 per cent or four-fifths, return to their former occupations without vocational training and 20 per cent require vocational training. One-half of those requiring vocational training, require complete vocational education, and one-

half, partial vocational re-education. Accepting these ratios as significant for the overseas forces of the United States and assuming that the United States will send over 1,000,000 men the first year and will increase its expeditionary force by 1,000,000 each year for the duration of the war. The following deductions are, perhaps, warranted, as forecasting conditions at the close of one year of fighting.

Number of men overseas	1,000,000
Number of men returned unfit for military service	100,000
Number not requiring vocational re-education	80,000
Number requiring vocational re-education, complete	10,000
Number requiring vocational re-education, partial	10,000

In a word, for each million men overseas it may perhaps fairly be expected that 100,000 men will be returned each year, of whom 20,000 will require complete or partial vocational re-education. This number of men may in fact be in hand to be provided for by the close of the summer campaign of 1918." It is evident therefore that the question of vocational training must be taken up on a large scale and first one must consider certain aspects of the matter which seem fundamental. These are: (1) The new trade should be so far as possible affiliated to and like the former occupation. Instances of this would be where a house painter would become a sign painter; a barber a wig maker; a mason or a carpenter a draftsman or architect's clerk. The house painter with disabled legs would make a poor wigmaker and the barber, a poor sign painter. A mechanic was earning three dollars a day before the war and was disabled. He was given a course of ten weeks in mechanical drawing and now earns twice as much. (2) The new occupation if it cannot closely resemble the old one, should be one adapted to the individual's capacity and education. This is less important than it might seem because the experience of a year in Belgium has seemed to show that the choice of the original occupation was usually haphazard (De Paew). As examples of this change of occupation, a waiter whose right arm was disabled took up sign painting with his left hand and in six months became a master workman. A clown disabled for the ring became a most successful ornamental printer. A man before the war had driven a team and worked on a pile driver at fifteen to eighteen dollars a week and is now earning thirty dollars as a machinist. (3) The occupation should be one in which there will be a demand for workers after the war. This, of course, is self-evident, but further than this, the man should be educated along the lines for which there is demand in his special community.

The man whose home is in the country would be educated along agricultural lines and the man from the large cities in manufacturing, salesmanship, stenography, etc. This need is not compelling but, in general, an occupation should be selected which would not necessarily mean a change of residence. (4) In certain instances the man's special technical vocational training must be preceded by some general education in such fundamental studies as reading, writing and arithmetic, which will enable him to qualify for some position not necessitating manual labor for which he may have been wholly incapacitated. A soldier writes, "When I came back from the front in October, 1916, I was not able to read or write. . . . Before the war I was driving a team at fifteen dollars a week." He took a course in the machine shop at McGill and says: "If it had not been for the school I never would have been in the place where I am today, and I expect to get about thirty dollars a week."

The selection of a new occupation will rest with the vocational director after consulting with the surgeon as to the man's special disability. The director talks with the man, makes a survey of his education and previous trade, his mentality and his tastes, tells him of the successes of other re-educated men and encourages him to ambition and hopefulness. At Port Villez in Belgium, for instance, after this, the man is allowed to visit the workshops where there are forty-eight trades. He walks about them, talks to the men employed, and is given two or three days to consider the matter. He then comes before a board consisting of the surgeon, the technical director and the vocational director and with their

assistance, chooses a trade provisionally in which he goes to work. If this proves unsuitable he may change, but changing and uncertainty are discouraged. There are two practical obstacles found on the part of the soldier to vocational training. First, laziness, and second, the fear that if he is physically improved his pension will be cut down. This latter matter has been dealt with by provisions that the man's pension is estimated on his original injury and is not affected by his improvement. This is regarded in Canada as so important that in convalescent homes and hospitals there is posted a statement that pensions depend solely upon degree of disability and are not influenced by increased earning power.

The trades which are taught need not be mentioned individually. They may be divided roughly into three groups.

1. Industrial. Trades, machine work, blacksmithing, metal work, carpentry, tailoring, brushmaking, shoemaking, leather work, box making, toy making, bookbinding, manufacture and repair of artificial limbs, etc.

2. Commercial. Clerical occupations. Stenography, telegraphy, designing, bookkeeping, mechanical drafting, etc.

3. Agricultural pursuits.

Placement. Finally comes the terminal stage of vocational training, that of placing the man in a permanent position. Here again the public and through it, the manufacturers, must be educated to paying the country's debt to these men by employing them. There is to be met the natural reluctance of the manufacturer to employ a man for whom he fears he may have to make allowances and the possible opposition of labor with regard to these. The statement is made in *American Industries* for October, 1917: "There is an almost universal willingness on the part of manufacturers to give every opportunity to our workers who may be injured or crippled in the war." F. W. Keogh, editor of *American Industries*, the organ of the National Association of Manufacturers in a recent speech quoted the president of that association as saying: "I am first an American and a patriot and as such I will aid these men in every way possible. I am also a manufacturer with economical responsibilities to my stockholders, employees and others, and as such I cannot consider these men as employees unless I am convinced it is a sound business proposition." Fortunately evidence so far collected proves that the disabled soldier can return to industry as a sound business proposition for the manufacturers and for this reason it is essential that his training should be thorough so that in the years following the war he may be able to hold his own.

The attitude of labor toward these men is also a great factor. The general attitude of the British labor party as to treatment of disablement by war is that every possible opportunity should be offered for securing the best treatment and that every appliance that science can suggest should be devoted to the restoration and aid of those who have become disabled[1] and the labor party favors the opening up of every possible avenue of training to every man who desires to avail himself of it. The British trades unions are not only sympathetic but desire to assist the disabled man in every possible way to secure employment on remunerative work provided that there should be no dimunition in the standard of living or possibility of the disabled man being used to defeat the legitimate objects which the trade unions have in view. The man's first placement is of importance because no subsequent one will be so easily brought about.

The requirements for success in the whole of vocational re-education are judicious selection of the new trade, the utmost thoroughness in training, care, and discretion in placement.

Training of teachers. The training of teachers for bedside occupation, curative workshops and vocational training and especially finding men for the responsible post of vocational directors is another of the problems confronting us. The Federal Board for Vocational Education estimates that four teachers will be needed for every hundred disabled soldiers, and regards this as an undesirably low figure. On this basis, for every million men overseas, there will be required here 1200 such teachers. The provisions for

[1] Monthly Review United States Bureau of Labor Statistics. 1917, Dec.

educating these teachers are being considered by the Federal Board for Vocational Training as presented in a special Bulletin No. 5.

Industrial accidents. There will be a by-product of the war and its experiences which has been mentioned, and this is the fact that rehabilitation of those disabled in the industries will in the future be practised in the light of what we shall have learned from the rehabilitation of those disabled in war. In 1913 there were 700,000 industrial accidents in the United States involving more than a four weeks disability. In Scandinavia, Belgium, and France, there existed before the war trade schools for the re-education of those crippled by industrial accidents. There were also schools in Petrograd and Munich, but in this country the matter has never received serious consideration. Professor Amar may be quoted as saying: "The war will be over but the industrial work and the necessity for the scientific study and physical organization of it will be with us forever." A report of the Federal Board for Vocational Re-education summarizes the matter of our negligence as follows: "It is certain, however, that our economic future depends to a large extent upon the rehabilitation of those disabled both in war and industry. . . . The time has passed when the supply of skilled labor is as inexhaustible as our natural resources were thought to be. We can no longer afford to continue our former wasteful methods and we must conserve every vestige of labor as an economic asset." (Bulletin No. 6.) The problem of the industrial cripple cannot be lightly dismissed for its size and economic importance are very great. From a study of industrial accidents in sixteen states, figures made available by the publication of state bureaus, checked up by the standard accident table and Bulletin 203 of the Department of Labor, Rubinow drew the following conclusions: Of the 26,136,676 employees in the different states covered or not covered by the compensation law, there are about 1,900,000 non-fatal accidents per year. Estimating the number of permanent disabilities produced annually by industrial accidents in the United States, Rubinow[1] arrived at a mean estimate of about 83,000 per year. In 1916 there were injured on the steam railroads 196,722, not counting 10,000 deaths, and on the electric roads 4,606. That is practically 200,000 people. Naturally many of these accidents were unimportant and not disabling but in 200,000 injured on steam or electric cars there would obviously be a fair proportion of disabled persons. In April,[2] 1916, the Philadelphia branch of the Pennsylvania State Bureau of Employment, established a department for the placement of handicapped workers and visited fifty-five of the leading industrial firms in Philadelphia and made "progress toward overcoming the innate prejudice against the employment of cripples." Many instances are given of workers thus placed who are earning surprisingly good wages.

[1] Publication of the Red Cross Institutions for Crippled and Disabled Men, Series 6, No. 4.

SUMMARY

The difficulty of presenting this question of reconstruction must be evident. It is a new subject, only in its formative stage as yet, practically dating from 1915. There are many disputed points and many matters of policy yet unsettled and no mechanism has existed in the past for formulating and carrying on the demands which must be met.

In this matter we are not discussing a new form of charity, but are trying to formulate a plan to discharge a pressing obligation. Success depends upon sound public sentiment, and sentimentality and emotionalism have no place in the scheme; the government, the public, the manufacturer, the labor unions and the medical profession must join hands, and different points of view must be minimized for the common welfare. This is no small question which we face; it would be better for most of the seriously wounded men to die on the battlefield than for us to fail in our duty of efficiently caring for them and restoring them to the highest possible degree of economic efficiency. Let us hold up the hands of the Government in carrying out the carefully formulated and studied plans which will be announced in due time and let us remember that destructive criticism is easy and constructive organization difficult.

[2] Am. J. Care of Cripples, 1917, June.

COMBINED INGUINOFEMORAL HERNIA DUE TO SUPPURATIVE DESTRUCTION OF POUPART'S LIGAMENT, WITH USE OF THE SARTORIUS MUSCLE IN REPAIR

By E. D. TWYMAN, M.D., Kansas City, Missouri

COMBINED inguinofemoral hernia is an unusual type depending for its peculiar morphology on a defect or lesion of continuity of Poupart's ligament. Therefore, the visceral protrusion, whether originally inguinal or femoral, comes to occupy the aperture of exit of both types. In my case, Poupart's ligament was destroyed by suppuration. Observations of Holmes, Gross, and other older writers on suppuration in the groin and on the hernias that recur after operations, tend to show that such an occurrence is more common than would appear from the meager notes available in the literature.

Combined inguinofemoral hernia should be distinguished from coincidental inguinal and femoral hernia. The latter is one of the phases of multiple hernias (illustrated by Fig. 1) and is not uncommon. Some interesting estimates of frequency as observed by various authors will be referred to later.

It is also the purpose of this paper to distinguish combined inguinofemoral hernia, properly so called, from the inguinocrural hernia of Holthouse, with which it seems to have been confused in the elaborate classification of hernia by Ferguson.[1] That they are not identical is shown by the descriptions and tables in Ferguson's work and by the original monograph of Holthouse.[2] Dorland's *Medical Dictionary* has repeated the error or confusion of Ferguson's table.

The observations of Holthouse were keen, and, considering the time — 1870 — creditable. I am forced to omit his table, which, however, shows conclusively that the inguinocrural hernia he had in mind was not a combined inguinal and crural hernia, but merely an ordinary inguinal hernia that had turned outward into the groin.

[1]Modern Operations for Hernia, 1907.

[2]Hernial and other Tumors of the Groin and its Neighborhood. London: 1870.

He gives the following description and case records, the second of which I have abbreviated.

As the book is no longer available except at the Surgeon-General's office, I give the full original description.

Besides the above two forms of congenital hernia there is a third, which differs from them mainly in the direction which the protrusion takes, viz., outward into the bend of the thigh, instead of downward into the scrotum or labium, and which I shall venture to name the inguinocrural. Like the other two varieties, its sac is not an acquired formation (although I believe this to be true as a general rule, there may be exceptions, as in a remarkable case recorded by Mr. Hulke, where the sac, of acquired formation, occupied both the groin and scrotum, the testes remaining in the belly[3]), but exists as a congenital defect — the vaginal process of peritoneum in the male, and the canal of Nuck, as it is termed, in the female — remaining patent after birth and thus acting as a ready formed receptacle for a protrusion. If the testicle should not have descended, or only partially done so, the scrotum on that side is generally undeveloped; and a hernia passing out through the external ring, and finding no scrotal cavity to receive it, takes the direction in which it meets with the least resistance, i.e., outward; thus Mr. Aston Key in recording a case of this kind observes, "The hernia, instead of passing downward into the scrotum, turned, after emerging from the inguinal canal, over the tendon of the external oblique muscle, and appeared somewhat like a femoral hernia. The testicle had never descended lower than the external ring, and explained the peculiarity in the course of the hernia." But this explanation will not apply when the patient is a female; we must seek, therefore, for some additional reason for the hernia taking so unusual a course than an imperfectly developed scrotum; and this is probably in the large size of the external abdominal ring, and the lax condition of its pillars, as illustrated in the following case:

Case 3. Congenital inguinocrural enterocele, with testicle in the same sac. C. P., age 21, a strong, stout young man was admitted into the Westminster Hosptal on the evening of the 29th of May, 1868, for a large hernia in the left groin, which had made its appearance suddenly for the first time three weeks before, on jumping from a cart; but on the afternoon of his admission, while lifting

[3]Med.-Chir. Tr., xlix, 189.

a heavy flagstone into his cart, it had become much larger and also painful. At 9 p.m., the house surgeon being in doubt as to the nature and condition of the hernia, asked me to see it. I found a large, oblong, prominent tumor, the size of a goose egg, lying parallel with and above Poupart's ligament. It was movable, highly elastic, and resonant on a fillip with the finger; the skin over it was neither tense, red nor hot. There was no testicle in the scrotum, which could scarcely be said to exist on that side, but this gland could be felt, and formed the upper part of the swelling. On introducing the finger through the external abdominal ring, the outer margin of that opening was obscured by a fold of bowel which has passed through and out of the ring, and, finding no scrotum into which to descend, has passed outward and upward, and lay immediately between the integuments and the aponeurosis of the external oblique, constituting the tumor above mentioned. On pressing this downward a portion the size of a large marble could be made to protrude into the upper part of the undeveloped scrotum. As handling was painful and there was no sign of strangulation, the taxis was not employed, but ice was directed to be applied to the tumor, and two grains of opium in form of pill were ordered to be given every three hours if necessary. On the following day, the tumor had disappeared, and nothing but fullness occupied its former site; this was found to be owing to the testis which occupied a large adventitious pouch between the skin and the muscular aponeurosis, and could be pushed about from one part to another with the greatest freedom and without pain. The ring on the opposite side was small, and its pillars tense, and would only just admit the point of the finger, which gave pain.

It will be noticed in reading the above case that, notwithstanding the bulk of the protruded intestine, the finger could be readily introduced into the inguinal canal, proving, therefore, the large size of the ring and the lax condition of its pillars. This was further verified after the reduction of the bowel, and was in striking contrast with the condition of the opposite ring. Dr. Munro, in his *Morbid Anatomy of the Human Gullet*, p. 467, has recorded such a case in the female: "The herniary sac," he tells us, "was about two inches in length, and in shape resembled a Florence flask; the bulbous extremity, extending from the lower orifice of the canal, was contained in the upper part of the thigh, lying more in the course of a crural than an inguinal hernia. By dissection, we ascertained that the deviation from the usual direction of the tumor was produced by a premature separation from each other of the external pillars of the inguinal canal."

The following is a very interesting example of this rare form of hernia which occurred in a young female:

CASE 4. Irreducible congenital inguinocrural epiplocele, resembling an ovarian hernia. Miss ——, age 18, while swimming, had sudden pain and a sensation in the right groin as if something had given away. It always behaved (after the initial attack) like an inflammatory swelling. . . . I saw her . . . and found a small tumor in the right groin, of an oblong form and about the size of an unshelled almond. It was soft, tender to the touch, and was not more evident when the patient stood than when she was lying down. There was no appreciable impulse on coughing, and it could not be reduced; . . . it had never disappeared since its initial appearance three years before, though its size had varied slightly, and also the degree of tenderness. I diagnosed a small irreducible epiplocele, but some weeks subsequently, on learning from Dr. B. that it became larger and more tender on the accession of her monthly periods, I altered my opinion and looked upon it as an ovarian rupture, . . . It . . . was inclosed in a capsule, which I detached from the surrounding connective tissue quite up to the external abdominal ring, immediately outside of which it lay. . . . it was opened, and the supposed ovary at once displayed and nothing else. . . . The wound healed by first intention. On a subsequent examination — the tumor turned out to be only a portion of omentum but presenting exactly the appearance of an ovary.

Holthouse continues his remarks on page 18. The chief interest attached to the inguinocrural hernia lies in its resemblance to femoral rupture, for which it may be readily mistaken. "There are many cases within my knowledge," observes Dr. Munro, "where this mistake was never discovered until after the operation had been performed."[1] Its diagnosis in the male can be readily established by a digital exploration of the inguinal canal, and by the absence of the testicle from the scrotum; in the female by the normal condition of the femoral ring and the fullness in the course of the inguinal canal; and in both by the sudden occurrence of the rupture.

In the treatment of these congenital varieties of hernia, there is nothing special; and what is proper to be done in the several conditions to which hernia is liable will be pointed out in the chapter devoted to this part of my subject."

To present the reader with a bird's-eye view of the varieties of hernia spoken of in the preceding pages, I have arranged them as below:

I. Ordinary (sac formed gradually).

a. Incomplete or bubonocele.

b. Hernia in the inguinal canal.

c. Complete or scrotal (hernia above the testis).

II. Congenital (sac ready formed).

a. Inguinoscrotal (hernia above the testis. Hernia in front of and in contact with the testis).

b. Inguinocrural. (Hernia in bend of thigh between the skin and aponeurosis of the external oblique muscle.)

It is readily seen from the above cited descriptions and case reports that Holthouse's hernia is not a combined inguinocrural or inguinofemoral hernia, but is only an inguinocrural hernia in the sense that the sac takes that direction after emergence from the ex-

[1]Morbid Anatomy of the Human Gullet.

ternal abdominal ring in the usual manner. As it comes to lie under the skin of Scarpa's triangle, it might better be known as inguinoscarpal, to distinguish it from the more usual inguinoscrotal type. It is evident from the remarks of Holthouse quoting Munro and Key and Hulke that true Holthouse hernia is not a great rarity, and the possibility of its occurrence should constantly be kept in mind in the differential diagnosis of femoral hernia. I have a record of a case of my own in which I made a diagnosis of incarcerated femoral epiplocele and at operation found that the sac had emerged from the external ring and passed downward over Poupart's ligament into the groin. In another case there were sacs in both femoral and inguinal rings, and in a number of cases the typical reflection of a sac of femoral origin upward over Poupart's ligament was observed. As the contents of the sacs could not be reduced and were under considerable tension the specific diagnosis was not correctly made in all cases. As the patients were all women the inclination was to regard all these hernias as probably of femoral origin. There is no penalty for such a mistake in this day of open operations, as the truth is readily apparent when the sacs are dissected out. But at the time of Holthouse's first paper, "Practical Observations on the Radical Cure of Inguinal Hernia," 1858, when the operations of Riggs and of Wood were the operations of choice, or even at the time of the second publication it might have invalidated the procedure proposed for relief.

Ferguson appears to be the next to attempt an authorative classification of hernia. He says:

> In attempting to make a classification of abdominal hernias, one is confronted at the outset by the fact that up to the present no one has made a classification which is of any marked service to the clinician or to the student. There are so many varieties of hernia and combinations of different kinds that it seems almost hopeless to undertake to make any sort of classification that would be of use to anyone.
>
> It is customary to refer to hernias as being congenital or acquired. That is a classification based on etiology. It cannot be subdivided. Then hernias are divided into inguinal, femoral, ventral, diaphragmatic, etc., making it incumbent on the physician to memorize the various forms of the affection without any systematic attempt at classification.
>
> In presenting the following arrangement, the author has divided hernias of the abdomen and its walls with reference to their topography into (1) anterior, (2) posterior, (3) superior, (4) inferior, (5) lateral, and (6) internal. This classification, although new, possesses the recommendation of being exceedingly simple and withal logical. It is an anatomic classification. To the best knowledge of the author, no other concrete and simple classification of abdominal hernias has been made; and the one here offered may be somewhat crude and open to improvements. However, it will serve as a guide in future efforts at classification of these hernias.

His table covers three pages with great detail. Under "Anterior Herniae" he gives: (a) inguinal, with ten subdivisions (in common with other writers he has mixed hernias of different exits, with those distinguished by the final position of the sac); (b) femoral, with seven subdivisions; (c) inguinocrural (Holthouse combined inguinal and femoral); (d) anterior retroperitoneal (Treves); (e) epigastric; (f) ventral (congenital or acquired); (g) urachal; (h) umbilical, with five subdivisions.

It is readily seen that Ferguson has placed combined inguinocrural hernia properly in his outline, but has improperly credited it to Holthouse. Also that Holthouse's hernia, inguinocrural, or, more properly, inguinoscarpal hernia, should be added to Ferguson's outline under the subheading of oblique inguinal hernia as a subvariety. This would serve to distinguish it from inguinoscrotal hernia, which is the alternative course of the sac.

There seems to be no doubt that Ferguson had seen or at least had heard of cases of combined inguinofemoral hernia, and that it was a purely literary error that led him to call it Holthouse's hernia. I have been at some pains to discover some other description or direct reference to this condition, but thus far have been unable to find one. Even Ferguson does not describe it farther than has been indicated. My case seems to be the first reported with a description. (Sections on hernia and its forms and classification were inspected in the Surgeon-General's Library Index, *Journal of the American*

Medical Association, SURGERY, GYNECOLOGY AND OBSTETRICS, and *Annals of Surgery;* Woods' *Monograph on Hernia*, E. V. von Bergman, *System of Practical Surgery;* E. W. Andrews in *American Practice of Surgery;* Bryant and Buck, *American Textbook of Surgery;* Coley and Bull, "Two Thousand Operations for Hernia," *Journal of the American Medical Association*, 1907; Moynihan, "Rarer Forms of Hernia," *British Medical Journal*, February 24, 1900; S. Weil, "Rare Forms of Hernia and Unusual Contents," *Zeitschrift fuer aerztliche Fortbildung*, 1913, x, 417.)

In regard to the etiology, there seems to be no record of a congenital absence or defect of Poupart's ligament.

However, any injury producing a lesion of continuity of Poupart's ligament would pave the way for a combined inguinofemoral hernia. Bayonet, sword, or bullet wounds may sever it. Or, it may be cut in the course of a surgical operation. Dr. Howard Hill advises free section of the ligament in cases of strangulated femoral hernia when the neck of the sac cannot readily be freed in the ordinary way. Ferguson mentions and advises its immediate division in case an aberrant obturator artery is wounded in operating on a femoral hernia, and the operation of J. Fabriquus for femoral hernia calls for severance of the ligamentous attachment to the pubic bone. And though it be immediately repaired one can conceive of failure of union or loss of the new attachment by infection, in which case a combined inguinofemoral hernia would be the result.

The operation of Roux, also used by J. C. Renton[1], may cause the severance of Poupart's ligament by excessive strangulation under the staple driven into the pubic bone. The same is true of operations in which the ligament is surrounded with wire, silk, or even catgut ligatures which are drawn too tightly. Even in the inguinal hernia repairs the tightly drawn sutures around Poupart's ligament may cut through, though doubtless it is the conjoined tendon that most frequently suffers in these cases. It is probable that it is in view of this danger that E. W. Andrews in his imbricating operation ties the deep mattress sutures outside all fascia layers in such a way that they never strangulate the ligament, as it does not truly surround the ligament at any one point. All authors advise avoidance of undue tension, and although I have not found a record of the ultimate disaster of the loss of the ligament, one might venture the opinion that if the scar tissue in old recurrent hernias after suppuration and failure of union were more readily separable, so that the true anatomy might be seen, this incident would be found to be of relatively frequent occurrence. An abbreviated quotation from Holmes' *System of Surgery*, p. 732, reads: "Crural hernia rarely reaches the size of inguinal hernia. But occasionally, after an operation for the liberation of a strangulated bowel, when the tissues around the crural aperture have been weakened by cutting them, and the sufferer has neglected to employ the support afforded by a truss, nearly the whole of the alimentary canal may protrude." He then quotes a case of the kind described where the tumor of a cylindrical shape reached to the middle of the thigh.

It does not seem to be stretching the argument to assume that this writer was really describing the occurrence of a hernia in which Poupart's ligament was either cut by the blunted bistoury which was the prescribed method of relief of the strangulating band in that day, or so weakened that it gave way later. At any rate, that it must have been lost, since as he states in his premise, "Crural hernia seldom reaches the size of inguinal," for the very good reason that it cannot do so as long as Poupart's ligament is intact.

Even allowing for the entire loss of Gimbernat's ligament, or the disruption of the tissues to the outer side of the crural ring so that the hernial protrusion entirely overlies the femoral vessels, as is the case in Velpeau's hernia, does not give space enough for such an enormous protrusion.

Loss of Poupart's ligament might occur as a secondary result of prolonged suppuration in a number of conditions.

Glandular suppurations, abscesses of the wall of the abdomen, psoas abscesses, stangu-

[1]See Binnie. Operative Surgery, 6th ed.

lated omentum, or strangulated bowel with pus formation and opening to the surface, appendicitis in the hernial sac, or appendicitis with the appendix lying on the back of a hernial sac with abscess formation, or, lastly, appendiceal abscess forming in the usual location, but traveling downward under Poupart's ligament, may be considered as conditions predisposing to this accident.

Howard Kelly,[1] mentions abscesses opening into the bowel, into the bladder, into the pleura, into the gluteal region with involvement of the trochanteric and gluteal muscles with pus, and then says: "Lastly, an abscess may point under the crural arch, and even as low as the popliteal space." Gross under "Affections of the Groin" records abscesses of the groin which develop in the late stages of typhlitis and perityphlitis which toward the last developed a green color probably due to staining from the intestinal contents. Hill calls this "green groin."

Holmes' *System of Surgery*, p. 594, *Abdominal Abscesses* by George Pollock revised by J. H. C. Simes, M.D., reads: "When the external opening has been long delayed by nature or the surgeon, we find, in addition to the suppurated cavity in the iliac region, that the abscess *has passed under Poupart's ligament.* . . . after a time other collections of matter point, either in the groin or the thigh or about the ischiatic rami. Notwithstanding . . . we occasionally find a patient recover, as it were from a bed of death, and after he has endured the opening of a great number of consecutive abscesses, the sinues slowly contract, the discharge diminishes by degrees, and ultimately ceases. The patient, however, recovers with a crippled limb, as a general rule. The suppurative action usually implicates the psoas and iliacus so much, and often the adductor muscles, that the movements of the thigh are subsequently restricted nor can the limb be extended to its normal limit." It is such a suppuration as this, fortunately no longer seen, that destroyed the ligament in my case.

The appendix may lie in the sac of a hernia; according to Kelly in 1 or 2 per cent of cases, or in the wall of the sac, as first reported by Finney (quoted from Kelly). Every operator has seen both occurrences, and appendicitis in the sac is not uncommon, both with or without abscess formation. The diagnosis can occasionally be made before operation.[2] However, coincident appendicitis in hernia has been diagnosed strangulated hernia. As either appendicitis in hernia or strangulation of the appendix in hernia may cause the other condition, it is sometimes a fine point to decide, even after operation. In either case, the suppuration, if long neglected, may lead to ligamentous destruction. Nor must one forget that the same sequence of events may occur in the hernial rings of the left side of the body, either in cases of *situs transversus*, general splanchnoptosis with elongated cæcum and appendix, deformities of the spine[3], or as seen in the case of autopsy No. 2136, Johns Hopkins Hospital, 1913, a large iliac hernia on the left may draw the appendix and cæcum over.

As there is no record other than the patient's report of the saying of his physicians at the time of the original illness, one is not able to decide just what the sequence of events was in the following case. The foregoing considerations were set down as bearing on the general possibilities of such formations.

The case was observed in 1913, and may be described as follows:

Fred K., farmer; age 41; weight 220 pounds; married; had enjoyed good health and had not noticed the presence of any signs of inguinal hernia. At the age of 24 he had experienced a severe illness, diagnosed by his physicians as appendicitis, at that time a little recognized disease. An enlargement, which proved to be an abscess, formed in his lower right abdominal region, and in 6 or 8 weeks it pointed in two places, i.e., the right inguinal region and right Scarpas' triangle. These were incised and the two resulting fistulæ discharged foul pus for five months. Later he noticed a bulging in this region which proved to be a definite hernia. The tumor increased in size despite the employment of various bands and trusses prescribed for the purpose of giving support and retaining the viscera. It became progressively more difficult to control, and there were several attacks of partial strangulation or torsion. These always yielded to rest and taxis, but in 1913 he has a specially severe attack follow-

[1]The Vermiform Appendix and Its Diseases, p. 204.

[2]Coley. Ann. Surg., Phila., 1895, xxi, 385.

[3]Cited by Foerster. Univ. of Pa. Mag., 1901.

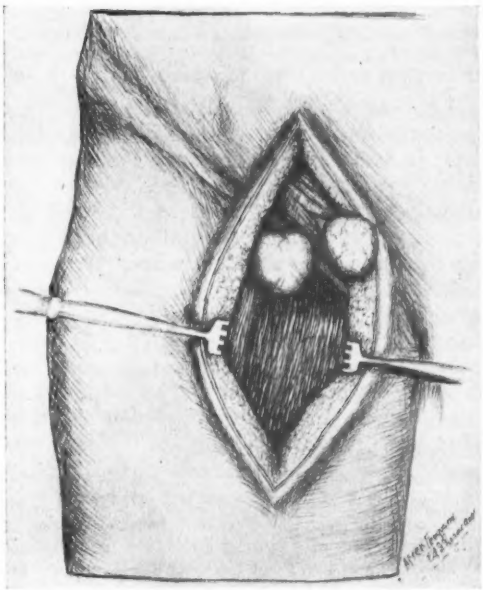

Fig. 1. Multiple hernia.

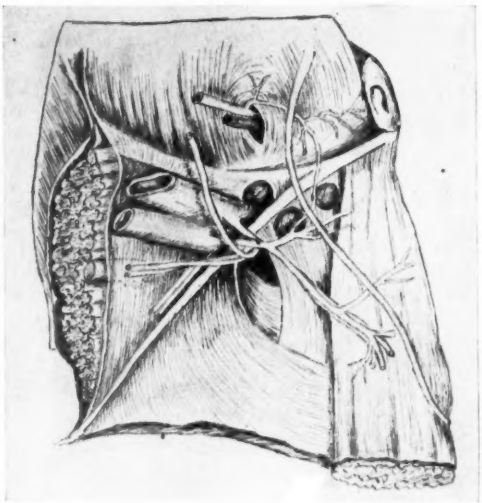

Fig. 2. Normal anatomy (modified after Gray and Ferguson).

ing a fall in which there was direct trauma to the hernia and its contents. By this time there was always a quantity of viscera in the sac and he wore a sort of quilted abdominal supporter with leg straps for protection. During all this time the patient was gradually increasing in weight, which added to the discomfort of the hernia and the difficulty of its retention. He had had no further appendiceal symptoms.

Physical Examination. A fat, but otherwise healthy appearing male. In the right groin appeared a bulging tumefaction larger than a fœtal head at term, occupying all the space of an inguinal hernia plus the femoral or space of Scarpa's triangle. The edges of the defect subtended the entire amount of space of the protrusion.

Two scars were present, with some cheloid formation of skin, one above and one below the usual site of Poupart's ligament. The usual groove marking the site of this structure was absent. In spite of this, the true condition of combined inguinofemoral hernia was not suspected, as I was not familiar with it.

The right scrotal region also was distended. There were both tympanitic and dull areas over the sac on percussion. On lying down, a part of the contents could be returned to the abdomen, but not all. A diagnosis was made of right inguinal hernia partially incarcerated, with loss of tissue from the previous suppuration.

He was given a guarded prognosis regarding the probability of a cure and warned of the possibility that a right castration or a transplantation of the testicle would be required to make a permanent result more likely. He definitely rejected the right castration, but consented to the transplantation should it be necessary.

He was placed in a recumbent posture for four days and the bowels thoroughly emptied. The tissues were relieved of the pressure, and rested. Under ether the fistulous skin scars were removed, and the neck, area, and contents of the sac defined. It was found that Poupart's ligament has sloughed away from over the crural vessels, and that the hernial sac occupied the usual space of both inguinal and crural hernias, lying directly upon the femoral vessels. A plausible explanation for the two fistulæ was then apparent. It appeared that the abscess must have pointed through both inguinal and femoral canals, and all the intervening tissue sloughed away. There was fusion from the inflammatory process of the muscular and fascial tissues of the superior edges of the gap in the abdominal wall. This gap or defect extended upward for four or five inches, and was bounded externally by the anterior superior spine of the ileum and internally by the outer border of the rectus plus a fringe of scar tissue and the remains of the oblique and transversalis muscles. Below, the sac lay on the femoral vessels and the tissues of the floor of Scarpa's triangle. Recognizable vestiges of Poupart's ligament remained at either end entangled in scar tissue, but the crural arch had disappeared and the falciform ligament was gone. Scar tissue overlay the vessels in the region of the saphenous opening and upward.

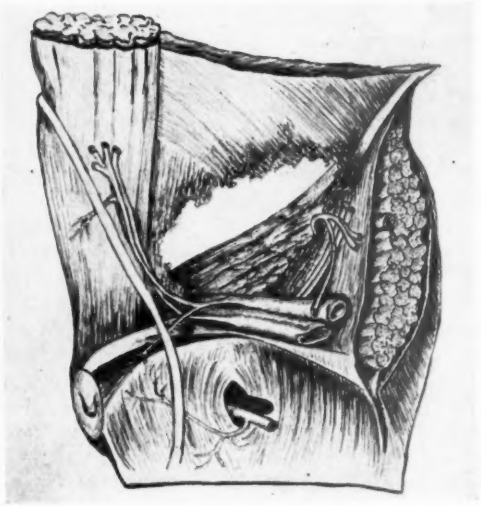

Fig. 3. Diagrammatic drawing showing altered anatomy in author's case.

The contents of the hernia were colon, omentum, and small intestine. The colon had slid into the gap so that a part of its retroperitoneal surface projected into the hernia.

All of these were returned to the abdomen with less difficulty than would have been expected, the preoperative preparation having reduced the size and made the reduction easier. The cord was lifted and the peritoneum attached to the posterior surface of the colon after the manner of B. Niederle,[1] i.e., the edge of the peritoneum covering the colon was united to the peritoneal side of the flap as far to the inner side of the opening as it would reach, then the remainder of the sac was laid down on the posterior or extraperitoneal side of the colon and attached by suture as far to the outer side as possible. In this case the remaining sac was so extensive together with the fat and cord tissues as to permit of a second reflection of the sac material onto itself in front of the defect, forming a pad after the principle of the Macewan operations for hernia.

The cord and testicle were disposed of in the following manner: The testicle was lifted from the scrotum and the scrotal sac obliterated by sutures. The testicle was then transplanted into a pocket in the preperitoneal fat below the pelvic brim. The cord, as stated before, lay in front and to the outer side of the sac. An attempt has been made in the modified diagrammatic drawing to show what I conceive the anatomy to have been. See Figures 3 and 4. The position of the deep epigastric vessels to the inner and lower side of the protrusion I feel sure is correctly portrayed, and the cord to the outer. Figure 2, modified after Gray and Ferguson, shows the normal anatomy of the region.

I realize the possibility that there was first a direct protrusion through Hesselbach's triangle, and that after having attained a certain size the further giving way of the damaged tissues may have so increased the area of the protrusion as to allow the greater bulge on the outer side of the deep epigastric vessels which then slipped or were crowded more and more to the inner side, finally assuming the position in which they were found. The cord crossed the sac into the scrotum. Another possibility is that both inguinal and crural sacs pre-existed and that they were crowded into one as the sac grew larger. The femoral vessels were overlaid *in toto*.

No attempt was made to separate the tissues of the inner edge of the gap into their anatomical elements. But using the pressure thickened strong edge, and taking large amounts of the tissues in each stitch, the inner edge was drawn down and sutured with kangaroo tendon and chromic gut to the following tissues from within outward; Cooper's ligament, periosteum of the illeo pectineal line, scar tissue remains of Poupart's ligament and the beginnings of the fascia lata or femoral fascia. This resulted in more tension than was desirable, although the strength of the tissues looked promising for the result. However, the unsutured gap through which the femoral vessels emerged into the leg was an apparent and vexatious source of weakness and a potential point of recurrence. A survey for means of reinforcement was made. A flap of the fascia lata with an attached proximal base was lifted and reflected over the stitch line and sewed in place. This effectively covered the above mentioned gap, but as the fascia lata at that point in the thigh is not as thick and strong as in the outer aspects of the leg I was still unwilling to trust even the reinforced line with the tension of so large a gap in so fat a subject. The sartorius was readily made available through the large opening in the skin without further enlargement. It was split into two rather unequal portions, down to about the middle of the thigh, and the larger inner portion was divided squarely across at its lower end and swung inward and attached to the fascia over the insertion of the right rectus muscle. Of course, allowance had been made for the shrinkage of the muscle after the division. This placed a portion of the sartorius about the diameter of a half dollar squarely along and over the suture line it was designed to strengthen. It was secured at intervals by No. 1 chromic gut. It can still be felt in place

[1] Časp. lék. Česk., 1914, liii, 480; by Zentralbl. f. d. ges. Chir. u. i. Grenzbeb. (Hotchkiss same, and Binnie credits it to Guibe, 7th ed., p. 593.

and it has apparently preserved or acquired a nerve supply as it seems to contract when the leg is raised. The closure was completed by uniting the superficial fascia and the skin. A rubber wick was left to drain off broken down fat and serum. This discharged copiously for four or five days, although fortunately there was no suppuration. The leg was kept in a flexed position for two weeks and a binder applied. The healing was afebrile till the seventh day when a rise of temperature coincident with pain and some swelling and tenderness along the course of the left saphenous vein proved this to be the site of the trouble, but as œdema never developed we assumed that the deeper vessels were not involved, at any rate not to the point of complete obstruction. The patient was kept in bed for a month and a binder similar to the one he wore before the operation was applied with the advice that its use be continued for six months. A graduated series of exercises designed to strengthen the parts was also advised and practiced. Heavy lifting, straining at stool, etc., was forbidden. When I last saw the patient, in 1915, two years after the operation, there was no recurrence.

Multiple hernias are in the majority according to Gelpie[1], who cites an anatomical study showing at least a short (2.5 cm.) sac on the well side in 80 per cent of all cases of inguinal hernia. According to the theory of Koch, Waldyre and Vonbergman, this is due to the fact that if anatomical predisposition to one hernia exists it can just as readily produce a number. In conformity with this view, Kaufman and Bernstein[2] found in 279 dissections of unselected bodies that some hernia was present in 25.8 per cent, of which 6.4 per cent were single and 19.4 per cent were multiple. Further observations of interest were that men were ruptured two and three-quarters times as often as women, but that whereas in men the relation of multiple to single was two and one-half to one, in women it was nine and one-half to one. As for the number in one person, Ferguson seems to hold the palm with a report of ten in one and the same individual.

It is not at all probable that 25 per cent of all people are clinically ruptured, but only in an anatomical or predisposing sense, i.e., the presence of a sac. The foregoing quotations of frequency bear on the possibility that my case had a pre-existing inguinal or crural sac

[1]Hernia in unusual anatomical positions. Časp., lék. Česk., 1913, lii, 1383; by Zentralbl. f. d. ges. Chir. u. i. Grenzgeb.

[2]Etiology of hernia. Arch. f. klin. Chir., 1913, c, 1094.

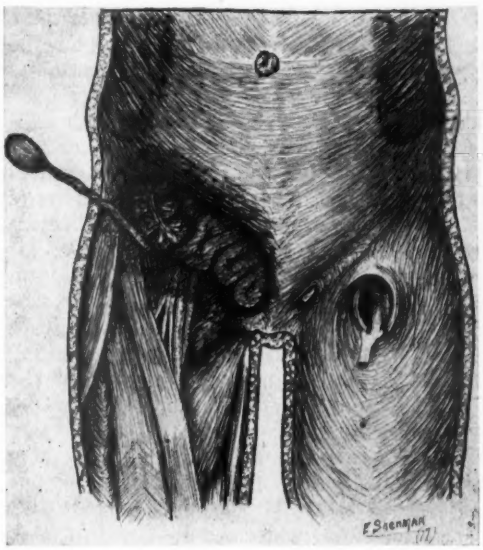

Fig. 4. Same as Figure 3.

or possibly both, even though it had never been noticed previous to the suppurative attack.

Berger reports 222 coincident inguinal and femoral hernias on one side, 87 times on both sides; 203 men and 19 women. In 105 cases there was an inguinal hernia on the other side also. Sometimes the inguinal hernia appears as a separate tumor, although they often appear as one mass somewhat separated by Poupart's ligament. In these cases there is really extreme relaxation of the abdominal wall rather than a true hernia. Strangulation rarely occurs.

Muscle and tendon transplants have very often been successfully employed for the purpose of replacing missing tissues, as the Fowler operation (for inguinal hernia with the use of the rectus muscle to replace the missing or defective conjoined tendon) for the restoration of functions, lost by paralysis, and for the mechanical plugging effect of so much tissue as in the Murphy transplantation of the pectoralis muscle to the axillary space after breast amputations, and the Polya operation calling for the plugging of the femoral canal by the crowding into it of all

or a portion of the sartorius muscle. The sartorius was used by Mantelli to fill the inguinal canal in cases with weak tissues and the same procedure is mentioned by Ferguson. E. Wyllys Andrews mentions the use of the tensor fascia femoris muscle for this purpose (no credit given), and also the reflection of the fascia lata from the upper part of the thigh to cover the repair line of an inguinal hernia. He calls all these unnecessary in view of the Andrew imbrication method, but in the above cited case the necessary tissues for the imbrication did not exist. Mantelli, as has been indicated, swings in the sartorius and lays it in the inguinal canal and fastens it by stitches to the abdominal side of the pubic arch, using the entire muscle for the purpose. It may be that this is a better method than the one used in my case. He closes the tissues over the sartorius in the usual Bassini way.

Since the successful free fascia transplants of Kirchner, Eidelberg, Aizner, Kernef, Neuhof and others it should now be considered a method of election for such cases.

The use of Cooper's ligament for a fixed point in the pubic region in repair work is one much disputed as to priority. It is variously credited to Seelig, Tuholske, Moschcowitz, Letheissen, and Dujarier.

E. Wyllys Andrews states[1] that the cure of inguinal hernias by castration was such a common procedure in France in the middle centuries that it had to be interdicted by law on the grounds of public policy. This proceeding, of course, simplifies the problem of a stable union by doing away with the traversement of the line of union by the cord which in addition to the mere matter of a sufficient opening for its passage must not be constricted by undue pressure. If this should happen, the testis might be lost by gangrene or atrophied from impaired circulation. Several such cases have resulted following the Halsted operation. Transplantation of the testis may accomplish the simplification of the closure, it seems to have been done by Lanphear in cases of the infantile type of hernia after first fashioning a tunica vaginalis for the testicle out of the peritoneum of the sac. The testis he then placed in the abdomen and proceeded with the repair. Of course, the testicle and cord could also have been brought out of a new opening in the abdominal wall at a point sufficiently distant from the repair wound not to weaken it. There would remain the danger of strangulation or of the formation of a new hernia at the point of emergence.

The cord transplantation of Fowler without disturbing the testis is altogether different.

The transplantation of the testis produces, of course, an artificial cryptorchidism. Some writers ascribe a malign influence of this position of the testicle in the matter of cancer formation. Coley and Bull, in their report of two thousand cases of hernia, in the course of which they encountered 114 cases of undescended testis, make this remark: "The danger of malignant disease developing as the result of undescended testis has, we believe, been exaggerated. No case of carcinoma or sarcoma of the undescended testis has been observed at the Hospital for the Ruptured and Crippled, at least not during the last 20 years; although it is but fair to state that one of us has seen sarcoma of the undescended testis in two cases observed outside the hospital."

It would seem that such a tendency, if any exists, could be accounted for either on the theory that there was a faulty embryological development or that the usual site of cryptorchids in the inguinal canal or external ring renders them more liable to trauma. If the latter were true and if the proposition could be supported that there is less likelihood of malignancy in a cryptorchid that has been operated upon and brought down (a very doubtful matter), then it should follow that the new position given this testicle in the abdomen should be just as safe or safer inasmuch as it is absolutely removed from the traumatic zone. If the first proposition is true, one would have to argue a peculiar chemical fitness of the scrotum as a place for the testicle to reside; a fitness, however, that does not seem to prevent the occurrence of malignancy in normally placed testicles. On these grounds one is inclined to accept the theory of traumatism as the activating factor.

[1]American Practice of Surgery.

No very authoritative figures appear to be available on the proportion of malignancies occurring in undescended testicles. Hertzler on tumors does not mention the subject.

Much more radical means than this have been advocated for the relief of large hernias. Barker[1] advocates the resection of the colon. The writer has advocated a colostomy on the opposite side to take pressure off the diaphragm after returning a large hernia to the abdomen and has had opportunity to practice colostomy to take pressure off the stitches of an end-to-end sigmoidostomy. It was a very successful measure and appears to me less dangerous than the resection plan advocated by Barker.

This case is reported in the belief that it calls attention to an anatomical occurrence, i.e., the severance of Poupart's ligament, that is not unique, but has probably been overlooked in some cases, and that it is worth while from a literary standpoint to distinguish properly the result — combined inguinofemoral hernia from the true inguinoscarpal hernia of Holthouse and from coincident inguinal and femoral hernia.

[1]Treatment of large hernias. Lancet, Lond., 1913, c, lxxxi, 1011; abstracted by Surg., Gynec. & Obst.

ABERRANT THYROID TUMOR OF THE TONGUE

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IT is the intention of the author to call attention to an interesting and rare type of tongue tumor and to report a case that has come under his care.

Frequency. Storr (1) in 1904 collected 29 cases of lingual thyroid tumors from the literature and reported 3 cases of his own. Murphy (2) in 1905 brought the total number up to 39 cases, which included 2 personally observed cases. Charles Mayo (3) reported 3 cases, and brought the known total up to 43. Since then the literature contains an occasional case, so that the writer can estimate the total number of cases which have been observed up to this date to be in the neighborhood of 70.

Age. Lingual thyroid tumors occur most frequently between the ages of 15 and 45. This is most likely due to the fact that at this time of life the thyroid gland is at its highest point of physiological activity. The thyroid tissue of the tumor is capable of assisting in the thyroid function; or it may take its place entirely, if the thyroid gland in the neck be entirely absent or atrophied. The tumor may, therefore, make its appearance because of the need of additional thyroid-secreting tissue. Ninety per cent of all cases have occurred in females. This is in conformity with the fact that the thyroid gland is most commonly affected in women, and at the period of greatest sexual activity of the organism.

Embryology. The thyroid gland develops from a median anlage, which is derived from the pharyngeal epithelium, and two lateral anlagen, which are derived from the epithelium of the fourth branchial cleft. The

Fig. 1. Photograph of patient.

median anlage is in relation to that part of the sulcus arcuatus (a groove between the tissue which becomes the epiglottis, and the tuberculum impar which becomes the tongue) directly behind and close to the tuberculum impar. The epithelium of the median anlage becomes thickened and sinks deeper through the elongation of the neck of the embryo, and in this way becomes distant from the inner surface of the pharynx. The pedicle connecting the original site with the thyroid isthmus is the thyroglossal tract or duct. The opening of this duct on the surface of the tongue is called the foramen cæcum. At the seventh week of embryonal life the thyroid isthmus (median anlage) units with the lateral anlagen which form the lateral lobes. The hyoid bone is apparently developed in the fifth week of embryonal life and crosses the line of the descending thyroid, which it entangles in its descent. Therefore, an aberrant descent of the thyroid from its original position, or an early formation of the hyoid bone, might force the development of this portion of the thyroid into the lingual or sublingual area. The lingual thyroid is usually an embryonic remnant of the thyroglossal tract and, therefore, consists of true thyroid tissue. The thyroglossal tract retains the power of producing thyroid tissue at any portion of its course, especially that part near the foramen cæcum. Thyroid tissue is all the more likely to develop here if there is an absence or atrophy of the thyroid gland. These embryonic remnants of thyroid tissue will develop when the human economy demands more thyroid tissue, and are very apt to decrease in size if the need of the body is supplied by thyroid feeding.

Pathology. Accessory thyroids may also be found in the deep muscles of the neck or attached to the hyoid bone by fibrous tissue. They vary in size from a hemp seed to an egg, and are round or ovoid in character. They cause no inconvenience unless some pathological process is produced. Here, as in the lingual thyroids, the thyroidal tissue may be embryonal or normal in structure, or may undergo any of the cystic, malignant, or other changes to which the thyroid gland is subject.

Examination. An aberrant thyroid tumor of the tongue is usually situated on the dorsum, just below and behind the foramen cæcum, which it may enclose in its growth. It is, as a rule, medianly located, but may extend a little more to one side. In shape it is round or ovoid. It varies in size up to that of a small apple. In all but two cases, the tumor was encapsulated. It may project greatly above the surface of the tongue or be buried in its substance. No inflammation or infiltration of the surrounding tissue occurs. The surface is covered by the mucous membrane of the tongue, and in only one case was there ulceration. The surface is usually smooth, but if small cysts are present, it is irregular. The surface is shiny and, because of its great vascularity, has a much darker color than the surrounding mucous membrane. These blood-vessels not only cover the surface, but penetrate deeply into the tumor tissue. This rich vascularization is characteristic and explains the profuse bleeding that follows surgical or other traumatism. The tumor may or may not be movable, depending upon the duration, size and depth. The consistency varies with the histology of the growth, depending upon whether it is normal thyroid tissue or colloid, cystic, or malignant changes have occurred. Occasionally, examination, as for laryngoscopy, may be necessary to reveal the presence of the tumor and its characteristics. Bimanual palpation, with one finger in the mouth and one beneath the jaw, should never be omitted. This procedure is absolutely painless because of the insensibility of these tumors. If the tumor is very large, it can be felt below the inferior maxilla, and may be mistaken for enlarged submaxillary glands.

Symptoms. As a rule, there is no local inconvenience. The patient may have the sensation of the presence of a foreign body in the pharynx. If very large, obstruction to the œsophagus or epiglottis may ensue, with the attendant phenomena of difficult and painful swallowing, spells of coughing, or even suffocation. Many complain of a fullness in the throat and a frequent desire to swallow, as if to swallow the tumor. The voice becomes thick and nasal. There is increased

salivation due to irritation of the salivary glands. Profuse hæmorrhage may result from injury to the vessels on the surface, e.g., puncture by a fish bone or trauma by the finger in examination.

Constitutional symptoms are usually absent until the patient begins to worry because of the diagnosis that she has a tumor. Symptoms of thyroid insufficiency can frequently be elicited. Menstruation may be irregular. The removal of the tumor may result in myxœdema if this is the only available thyroid tissue the patient possesses.

Prognosis-treatment. The prognosis is favorable. No postoperative deaths are on record. Operation, as a rule, effects a permanent cure. Therapy with thyroid feeding should be attempted and may result in a marked decrease in size, as has been observed in the author's case. Local treatment is without avail. Puncture may result in profuse bleeding, or infection with an increase in the size of the growth. Removal by galvanocautery leaves behind parts which regrow. The best operation is incision with enucleation, either by way of the mouth or through the suprahyoid region. Indications for removal depend upon the size of the tumor and the amount of interference with respiration and deglutition. Removal should be promptly followed by thyroid therapy on the first indication of hypothyroidism. Five cases operated on are reported to have developed myxœdema and three to have recurred. Three cases are reported to have died without operation. One of these was a stillbirth, one died soon after birth of asphyxia, and one died at the age of six months of cretinism. Two were accidental postmortem findings, and had nothing to do with the cause of death.

Diagnosis. Factors of extreme importance in making a diagnosis are the presence of a round, elastic tumor situated deep in the base of the tongue, the mucous membrane of which is deeply injected, but not ulcerated. The patient, usually a female, may for years be aware of the presence of a lump in the throat, which, however, gives rise to no marked inconvenience until a short time before consulting a physician, when a rapid increase in size causes trouble in breathing and difficulty in swallowing. The absence of a normally situated thyroid is of extreme importance from a diagnostic point of view.

Differential diagnosis. Sarcoma is painful, grows rapidly and reaches a great size. Carcinoma is painful, ulcerated, has an indurated border, fetid secretion and secondary metastatic cervical glands. Lipoma is soft, cystic, golden-yellow, makes its appearance at the middle or the tip of the tongue and does not bleed on puncture. Angioma has a bluish-black or violet color, pressure reduces its size with prompt refilling as soon as the pressure is removed, the tumor is somewhat spongy, irregular in outline and extends on to the lateral wall of the pharynx. Fibromata are usually pedunculated, vary in number, and are pale and seldom bleed. Gummata ulcerate quickly; there are often several lesions; there is no sharp border, the mucous membrane is not deeply injected or vascular; the Wassermann reaction is positive. Hypertrophied lingual tonsils are usually superficial, whitish-yellow in color, with hard concretions which project from the surface of the tongue—since they are infiltrated crypts of lymphatic follicles at the base of the tongue. Thyroglossal cysts are softer, yellowish or brown in color; the surface is less vascular and the mucous membrane thicker and more transparent. Ranula occurs on the floor of the mouth, pushes the tongue to one side, has a transparent wall and may be covered by large veins.

Microscopic examination of a portion of the tumor which has been removed for diagnostic purposes, will invariably reveal definite evidences of thyroidal tissue in these aberrant thyroid tumors.

CASE. Rebecca M., age 47, Russian, was admitted to the Jewish Hospital, December 27, 1915. Her chief complaint was difficulty in swallowing. Family history, negative.

Past history. Menses began at 14, regular every 28 days, 5-day duration, and ceased six months ago. She has been married 26 years, gave birth to 8 healthy children and has had no miscarriages or stillbirths. There are apparently no internal secretory disturbances in any of the children, except for one daughter who has a palpable thyroid of pubescence.

Present illness. The present illness began four months before admission, with a sensation of tight-

ness about the throat and some difficulty in speaking — her voice became muffled. She had frequent attacks of nose-bleed in the first two weeks. There was neither cough nor dyspnœa. A tumor of the tongue was discovered by a physician, who made a diagnosis of carcinoma and sent her to the hospital for amputation of the tongue.

Physical examination. Physical examination (Fig. 1) revealed a woman of short stature, presenting many evidences of decreased thyroid secretion. There was a moderate alopecia of the scalp, and the hair was dry, lusterless, straight, and in color a faded brown. Deep transverse wrinkles of the forehead were noticeable. The outer eyebrows were scanty. The eyelashes on the lower lids were practically absent. The eyes were widely separated. No epicanthi. Nose broadened. There were deep incisures of the lobules of the ears. The skin over the cheeks was thickened and of a dirty yellow color. In general, the skin was markedly harsh and dry. There were no supraclavicular pads. The tracheal rings were readily felt. There was no thyroid tissue in the normal site. The fingers were short and stubby, without lunulæ. The nails were broadened at the base and markedly brittle. The breasts were normal. No retrosternal thyroid palpable at the episternal notch, nor made out by percussion of the area behind the sternum. The tenth rib on each side floated markedly. There was a very acute costosternal angle. There was marked gastroptosis, with the greater curvature at the symphysis. The skin over the abdomen was markedly thickened and inelastic. The axillary and pubic hair was very scant. The lower extremities were small; the nails showed degenerative changes; double hallux valgus present. The pupils and pupillary reflexes were normal. There were only two teeth present in the mouth. The hard palate, in the median line, at the middle third, showed a hard, elevated ridge, evidently a hyperostosis. No gland of the neck palpable. The heart and lungs were normal. The knee-jerks were hyperactive.

Examination of the tongue. Very little could be seen until the tongue was pulled out. A tumor, one and one-half inches in breadth was seen on the posterior part of the tongue, extending to the foramen cæcum and epiglottis. The mucous membrane was not ulcerated and was covered by large veins. Palpation with the finger of one hand on the tumor and the fingers of the other hand in the suprahyoid region, demonstrated the fact that it occupied almost the entire thickness of the tongue, extending well into the suprahyoid region. The tumor was neither hard nor tender. Because of these characteristics of the tumor, the absence of a normal thyroid in the neck and the evidences of hypothyroidism, an absolute diagnosis of lingual thyroid tumor was made by the writer. A section of the tumor was removed for pathological examination. Marked bleeding occurred. This was controlled by many mattress sutures made in the tongue and tumor tissue. Because of the fact that this was evidently the only thyroid tissue the patient had, and because there were no alarming symptoms of œsophageal or laryngeal pressure, it was decided not to do a total enucleation. Urine examinations were negative. Red blood cells, 3,800,000. Hæmoglobin, 70 per cent. White blood cells differential,—polymorphonuclears, 55 per cent; lymphocytes, 33 per cent; mononuclears, 4 per cent; eosinophiles, 6 per cent; basophiles, 2 per cent. Blood pressure, systolic, 126; diastolic, 84. Wassermann of the blood, negative. Height, 4½ feet; weight, 82½ pounds. Pulse before operation, 64 to 80. Temperature before operation, 98.6° F. to 100°F. Examination of the removed tumor tissue by Dr. S. Blatteis, pathologist to the Jewish Hospital, revealed it to be thyroid tissue with marked adenomatous development. X-ray examination of the chest revealed no evidence of pulmonary or mediastinal new-growth. An old healed tubercular process was revealed at the right hilum and apex.

Treatment. The patient was placed on thyroid feeding and felt much better and gained in weight. She was then lost sight of for one year. During this time she had stopped taking her thyroid tablets and had developed marked evidences of a psychosis. She claimed that she was troubled with enemies who pursued her and damaged her furniture and her garments. She was withal very quiet and related her experiences with a smile. She was placed on mixed glands, including thyroid. One month later her family thought she was much better. On examination at this time, December 11, 1917, her lingual tumor was only half its original size, very hard, and nodular. Her weight was 116 pounds. A marked atrophic nasopharyngitis was present. The pulse and temperature were normal.

The writer thanks Dr. William Linder, attending surgeon to the Jewish Hospital, for the privilege of studying and reporting this most interesting case.

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A STUDY OF THE KRUKENBERG TUMOR[1]

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In 1896 Friedrich Krukenberg (1) described an ovarian tumor to which he gave the name "fibrosarcoma ovarii mucocellulare (carcinomatodes)." This tumor he considered essentially a fibrosarcoma, but he also noted the presence in these neoplasms of certain cells which morphologically bore a close resemblance to carcinoma cells and for this reason he added the term "carcinomatodes." Since Krukenberg's original description, many additional cases have been described and this tumor now generally described as the "Krukenberg tumor" has been the occasion of considerable discussion.

A review of the literature reveals that this tumor has been considered by some a fibrosarcoma, by others a carcinoma, and also that there has been a difference of opinion as to whether it is really a primary ovarian growth. We have recently had an opportunity of studying a classic example of this tumor and for this reason it seemed advisable to present our findings in this case together with a résumé of the cases reported up to this time.

In a review of the literature some difficulty has been found in deciding just which cases were true examples of this tumor. This growth was doubtless observed by some of the older pathologists before the work of Krukenberg. Waldeyer (2) in 1872 described an ovarian tumor which has been interpreted by some as a Krukenberg tumor. Similarly Leopold (3) in 1874 described two tumors which may belong to this group. Seeger (4) in 1888 reported two tumors which have been considered by some as examples of the Krukenberg tumor. An exhaustive study of the older literature on ovarian tumors would probably show many more belonging to this class. Since, however, we possess no definite criteria by which to judge these cases, we have confined ourselves in the main to a study of the cases reported since Krukenberg drew attention to this tumor.

An additional difficulty has been found due to differences in interpretation of these tumors. There are a number of cases of ovarian neoplasm reported which although they resembled the Krukenberg tumor have been put in other classes by their authors. This group of cases although some of them are probably examples of Krukenberg tumor have not been included but will be discussed separately. A somewhat different conception of the tumor was introduced by Sternberg (5) who describes a multiple endothelioma of the bone marrow as a Krukenberg tumor. However, since this tumor was limited to the bone marrow and both ovaries were small and atrophic, it would hardly seem to be an example of a Krukenberg tumor in the accepted sense, in spite of its microscopic resemblance.

Krukenberg's original communication described the tumor with sufficient clearness to permit of its identification in most cases by subsequent investigators. The characteristics of the tumor he noted, were that they are solid ovarian tumors, usually bilateral, appearing in youth as well as in old age and of slow growth. The entire ovary is increased in size, maintains on the whole its outline, but presents an uneven surface. Ascites is usually present. Microscopically the tumors show a well marked framework in the meshes of which are large swollen cells with a finely granular or mucoid protoplasm and the nucleus often is eccentrically placed. The thickening and extensive overgrowth of the ovarian connective tissue suggests a fibrosarcoma.

Krukenberg regarded the ovarian tumor as primary and it has been particularly about this point that much discussion has arisen, one group of observers describing it as a primary tumor, while the other group consider it a secondary growth. It is of interest perhaps to follow the views of each group separately.

Krukenberg's paper describes five cases. Two of his cases were specimens sent to the

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laboratory after operation and no further data is given. One case complained of stomach trouble and died after operation but no autopsy was obtained. Two of the patients came to autopsy; one showing a carcinoma of the stomach accompanying the ovarian tumor, while in the protocol of the other autopsy no mention is made of the stomach which would probably indicate that it was considered normal. In none of his cases is there a record of a microscopical examination of the stomach.

Sternberg (6) described a case with a full autopsy report in which the primary tumor was apparently in the ovary with metastases to the lungs and dura mater. The stomach was normal both macroscopically and microscopically. An interesting feature of his case was the presence in the bone marrow of highly vascularized osteoid masses.

Schenk (7) in 1904 reported a case of primary Krukenberg tumor. His patient had bilateral ovarian tumors which were removed at operation. About five months after the primary operation, the patient was readmitted with gastric symptoms and operated upon a second time. The patient died two months after the last operation. Autopsy showed a metastatic carcinoma of the periportal, mesenteric, lumbar, iliac and inguinal lymph glands. The stomach, pancreas, and intestines were apparently normal although no microscopic examination of these organs is mentioned.

Orthmann (8) described a primary ovarian sarcoma with extension to both tubes. The microscopic picture was that of a typical Krukenberg tumor. The patient died later but no autopsy findings are reported. Glockner (9) has reported a case of primary Krukenberg tumor in which the autopsy showed metastases to the spinal column but all the other organs were normal.

Rosthorn (10) reports a very interesting case in which there were bilateral ovarian tumors associated with multiple sarcomatosis of the skin, sarcomatous involvement of the lymph glands, lungs, liver, pericardium, pleura, and peritoneum. The stomach at operation was considered normal but no mention of it was made in the autopsy report.

Fischer (11) has reported two cases which he considered primary. Palpation of the stomach at operation in one case disclosed nothing abnormal and in the other case a gastric analysis showed no suspicion of cancer. Both cases left the clinic after operation and no subsequent notes are recorded. Fischer considers the tumor a sarcoma.

Krueger (12) in 1909 demonstrated bilateral Krukenberg tumors of the ovaries removed at operation from a patient nineteen years of age. He regarded the case as primary, apparently because of the age of the patient.

Outerbridge (13) studied a case of bilateral ovarian Krukenberg tumors, in which nothing abnormal was noted in the stomach at operation. The patient died later but no autopsy was performed. He thinks "that in many cases reported as secondary, the secondary nature is anything but satisfactorily demonstrated." Schwarz (14) reported a typical case of bilateral Krukenberg tumors. The patient died some time after operation and no autopsy was obtained. There were, however, no clinical symptoms of tumor in the gastro-intestinal tract. Foulkrod (15) described a case in which a later operation revealed a carcinoma of the stomach. He believed his case to be a primary ovarian tumor because no stomach tumor was noted at the first operation.

A brief summary of this group of cases shows that all 16 cases of Krukenberg tumor were considered as probably primary. Since a decision on this point to be convincing must rest upon autopsy findings, it is interesting to note that of the 15 cases only 6 came to autopsy. Of these 6 cases one case (Krukenberg's) showed a carcinoma of the stomach, in 3 cases the stomach was described as normal and in 2 cases no mention of the stomach is made in the autopsy report, which would suggest that the stomach was considered normal. In only 2 of this group of cases is there a record of a microscopic examination of the stomach (Sternberg and Glockner). Foulkrod's case showed a carcinoma of the stomach at a later operation.

Of the 15 cases 3 were stated by their authors to be sarcomata. All of the other observers adopt Krukenberg's term "fibro-

sarcoma carcinomatodes," and Glockner particularly emphasizes that this is a very accurate name for the condition. None of these observers apparently takes the view that it is a pure carcinoma.

As contrasted with this small group of cases in which the tumor was considered primary, there is a much larger series in which the co-existence of a gastric or intestinal carcinoma was either definitely proved, or was strongly suggested by the clinical findings in the case. In this series the ovarian tumor was regarded as secondary. Tiburtius (16) in 1899 described two cases of ovarian carcinoma secondary to carcinoma of the stomach. Although he does not refer to Krukenberg's work, his microscopic descriptions of the ovarian tumors describe quite accurately the typical picture of a Krukenberg tumor.

Kraus (17) reports a case occurring with a mucoid carcinoma of the cæcum. Wagner (18) describes a typical case which he regarded as secondary to a scirrhus carcinoma ventriculi. Schlagenhaufer (19) in an excellent paper on metastatic ovarian carcinomata, records two cases in which a gastric carcinoma was present. His article emphasizes the frequency of ovarian metastases in carcinoma of the stomach and he points out also that such ovarian tumors are often diagnosed on removal as fibrosarcoma or sarcoma.

Stauder (20) reports 3 cases of Krukenberg tumor, in one of which a gastric carcinoma was present at autopsy, while in the other 2 it was suspected clinically. Glockner (21) in a report of 17 cases of metastatic ovarian carcinoma found 2 cases of Krukenberg tumor, both with carcinoma of the stomach. He also believes ovarian metastases from the stomach to be much commoner than is generally supposed.

Amann (22) refers to 4 cases regarded as secondary. Stickel (23) describes a metastatic Krukenberg tumor secondary to a carcinoma of the stomach demonstrated at autopsy. Sandrock (24) reported a case in a patient with hæmatemesis and other symptoms of gastric carcinoma, who subsequently died but did not come to autopsy. Burdsinsky (25) has recorded an interesting case in which the Krukenberg tumor was complicated by pregnancy. A cæsarean section was performed and a living child delivered. The patient died later and the autopsy revealed a scirrhus cancer of the stomach.

Ulesko-Stroganoff (25) has reported 3 cases. All of the cases left the hospital "apparently cured" and their subsequent history is unknown. Two of the cases had symptoms of stomach disease, vomiting, loss of appetite, and diarrhœa. She believed her cases to be secondary to a colloid tumor probably in the stomach.

Cohn (27) has described 4 cases of Krukenberg tumor. One of these cases had a primary carcinoma of the stomach, 1 had a carcinoma of the sigmoid, 1 case showed enlarged retroperitoneal glands at operation but no definite cancer, and the fourth case showed no cancer at autopsy. Cohn, however, in a discussion of these cases notes that of the 2 cases which had apparently no primary cancer of the gastro-intestinal tract, 1 case at operation strongly suggested such a complication and the other case was autopsied in 1898 and no microscopic study was made. The œdema of the colon noted at autopsy, however, strongly suggested a cancer of this organ.

Hussy (28) reports a case following resection of the stomach for a carcinoma. Kuhlhoff (29) describes a patient with a Krukenberg tumor who died two months after operation. No autopsy was obtained but as the patient often vomited blood and passed tarry stools, it was regarded as a case of gastric carcinoma.

Jacobson (30) studied a patient who showed cancer of the stomach at operation. No autopsy was performed.

Mandl (31) reports a case in which a carcinoma of the pylorus was felt at operation. Hall (32) studied a case which came to autopsy and showed a carcinoma of the pylorus. Bondy (33) presented 4 cases which he considered as secondary. Stone (34) has described 3 cases; 1 secondary to a carcinoma of the stomach, 1 a probable metastasis, and in 1 case no data was available. His article is an excellent study on the subject of metastatic ovarian carcinoma and contains a good review of the literature. Reel (35) describes the examination of a specimen removed at

operation which suggested a metastatic growth.

A brief review of this series where the ovarian tumor was regarded as secondary, shows that in all 38 cases have been described. Of this number, 12 showed a primary tumor of the gastro-intestinal tract at autopsy, and in 5 cases, a carcinoma of the stomach was seen at operation. Eight cases, in which no autopsy was performed gave a history of gastric disease, 2 of them vomiting blood. It would be hazardous to regard all of these 9 cases as having a cancer, but the 2 vomiting blood were almost surely suffering from malignant disease of the stomach. This gives a total of 17 of the 38 cases suffering from carcinoma of the stomach or intestines, 2 cases most probable and 6 cases doubtful but probable — 25 in all. In 4 cases it was considered probable from operative findings, and in 9 cases no data was given. In all it seems safe to assume that in at least 19 of the 38, or 50 per cent, the diagnosis of a primary carcinoma elsewhere was established.

A third series of cases, those of probable Krukenberg tumor, is of interest also. Bode (36) described a case of "endothelial sarcoma" of the right ovary in a patient who was operated upon two years previously for a carcinoma of the pylorus. Rosinsky (37) observed two endotheliomata, one of which was associated with a tumor of the stomach. He recognized the resemblance to the Krukenberg tumor, but preferred the diagnosis of endothelioma. Fleischmann (38) reported a case of "fibrosarcoma myxomatodes" of both ovaries in a patient who showed at autopsy a carcinoma of the pylorus. Romer (39) described 2 cases of ovarian carcinoma secondary to carcinoma of the stomach. His description of the ovarian tumors suggests strongly the picture of a Krukenberg tumor. Polano (40) studied 5 cases of malignant ovarian tumors, 2 of which were metastatic: One, diagnosed as an endothelioma was secondary to a mucoid carcinoma of the breast and the second case diagnosed as a fibrosarcoma was a metastasis from a gastric carcinoma. Stickel (loc. cit.) describes 12 cases of metastatic ovarian carcinoma which resembled in part the Krukenberg tumor.

If the cases of this group are really those of Krukenberg tumor, an analysis shows that of the 17 cases, all but one were definitely metastatic. It is also of interest that 3 of these cases, although resembling closely the Krukenberg tumor, were diagnosed as endothelioma. The diagnosis of endothelioma of the ovary has been very frequently made particularly by certain investigators. Krukenberg himself describes his tumor as resembling closely an endothelioma. The statement of Aschoff (41), however, that most endotheliomata of the ovary should be considered as carcinomata represents a point of view that is constantly gaining ground.

The following case is presented as a contribution to the subject of the Krukenberg tumor. It is of considerable interest since in this patient those questions are fairly clear concerning the primary or secondary nature of the tumor, the origin of the striking tumor cells present and also as to its probable method of metastasis.

The patient, A. G., a colored woman, age 40 years, was admitted to the Bell Memorial Hospital complaining of headache, dimness of vision and pain in the stomach. Her present illness began about one year before admission with pains in the stomach and vomiting. At times she vomited blood and had tarry stools. Her condition has grown steadily worse and she has lost 80 pounds since the onset of her illness. The most important of the physical findings was the presence of a mass in the pelvis. The blood examination showed red blood corpuscles 4,000,000; white blood corpuscles 10,500; hæmoglobin 40 per cent. She died suddenly on June 10, 1917 and the autopsy was performed eight hours after death.

The autopsy showed the body of a very emaciated woman 165 centimeters in length, very little subcutaneous fat present. On opening the abdomen, there was about 500 cubic centimeters of clear straw-colored fluid present. The heart, lungs, spleen, liver, pancreas, and adrenals were apparently normal. The kidneys showed a finely granular surface on stripping the capsules. The pituitary gland was enlarged and weighed 950 milligrams. The organs of most interest were the ovaries and stomach.

Both ovaries (Fig. 1) are the seat of nodular tumor growths, about equal in size and measuring 7 x 9 x 7 centimeters. The surface of each nodule is quite smooth, and the individual nodules vary greatly in size, the largest measuring 4 x 5 centimeters. The smaller nodules are white and quite firm, while the larger nodules have a reddish purple color and are much softer. The right ovary contains a cyst measuring 4 x 5 centimeters, which has a

smooth wall and is filled with a clear yellowish fluid.

The stomach (Fig. 2) is somewhat shrunken in size, measures 14 x 7 centimeters and the anterior surface is covered with numerous very small wart-like elevations. The wall of the stomach is markedly thickened, measures on the average 1.2 centimeters in thickness and is quite firm and tough. The mucous membrane of the stomach is somewhat reddened but is everywhere quite smooth. There are no erosions of the stomach mucosa and no tumor anywhere growing out from it. There is an enlarged lymph gland at the hilus of the stomach. The picture is that of a typical "leather-bottle stomach." There are a few small white nodules about 3 millimeters in diameter, in the wall of the jejunum near the mesenteric border.

The microscopic examination of the ovaries showed the tumors to be characteristic of those described by Krukenberg. The tumor consists of a fibrous, connective-tissue framework, generally rather loose, in the meshes of which are large clear cells. Here and there are collections of cells arranged in solid masses or often in alveolar formation. Some polymorphonuclear leucocytes are also present in places (Fig. 3). A high power magnification shows that these cells have a somewhat eccentrically placed, deep-staining nucleus, the protoplasm is clear or vacuolated presenting in some places on this account the "signet ring" appearance, the vacuole in the cell forming the lumen of the ring and the nucleus the seal (Fig. 4). The protoplasm of these cells in many instances was stained blue with Mallory's aniline blue stain suggesting a mucoid substance. Stains with scarlet R also showed that many of these cells contained fat droplets.

One of the most striking features of the microscopic examination of the stomach is the excessive growth of fibrous tissue in the wall. Also here and there are collections of large clear cells with an eccentric nucleus, apparently identical with the cell found in the ovarian growths. In many places these cells form acinar structures. A study of the mucous membrane of the stomach shows that while often those portions of the gastric glands near the surface are normal, the lower portions of the glands are transformed into strands of clear tumor cells with eccentrically placed nuclei. In some places these glands still preserve their acinar structure and the cells forming the acini are transformed into tumor cells. Figure 5 shows such a picture and apparently demonstrates quite conclusively that these clear cells are derived from the cells lining the gastric glands. A similar picture was noted by Wagner (loc. cit.) in his case. The origin of these cells from the cells near the base of the glands, and their growth downward with extensive connective-tissue reaction apparently explains why there is such a marked thickening of the wall of the stomach although the surface appearance of the gastric mucosa is normal. Also it was noted that the tumor cells were very numerous in the muscularis between the muscle fibers and also were present in the serosa. A study of the section from such a stomach also emphasizes the importance of a microscopic examination before pronouncing a stomach normal in cases of Krukenberg tumor. In its earliest stages this stomach probably would have appeared normal to the naked eye.

Such a tumor presents ideal conditions for the formation of the so-called "leather bottle stomach." Lyle (42) has made a comprehensive study of this condition which may be of cancerous or of non-malignant origin. He has collected 60 cases cancerous in nature and 70 cases of benign origin. Our case is the only one noted in the literature where this unusual condition, the "leather bottle" stomach was associated with a Krukenberg tumor. It should be noted, however, that Welch (43) in 1893 referred to a similar condition of the stomach, secondary to a bilateral carcinoma of the ovaries.

A microscopic study of the lymph gland near the hilus of the stomach presented a picture of some interest. A low power magnification of this gland (Fig. 6) suggests very strongly the diagnosis of fibrosarcoma. A higher magnification (Fig. 7) shows, however, the typical large clear cells with eccentrically placed nuclei, surrounded by a dense meshwork of connective tissue.

Such pictures as these which were also noted in the stomach wall and in the ovaries, doubtless explain why the Krukenberg tumor was called a fibrosarcoma mucocellulare by its discoverer and why some subsequent investigators like Fischer (loc. cit.) call it a fibrosarcoma. Schlagenhaufer (loc. cit.) noted in his studies that one case in his series which had after operation been diagnosed as sarcoma of the ovary, showed at autopsy a carcinoma of the stomach with ovarian metastases. Temesvary (44) has stated that in 300 cases of ovarian sarcoma collected by him, 3 cases showed at autopsy carcinoma of the stomach and 1 carcinoma of the rectum. Kratzenstein (45) reports a case diagnosed as fibrosarcoma of both ovaries which at a later autopsy showed a carcinoma of the stomach. Koetschau (46) similarly reports a bilateral "sarcoma of the ovary" which showed at autopsy a gastric carcinoma.

In our case the origin of the tumor being apparently from the stomach, the method of metastasis remains to be considered. Aside from the lymph gland at the hilus and a few small tumor growths on the jejunum there were no metastases except in the ovaries. The liver so commonly involved in the other carcinomata of the stomach showed here no metastases.

Kraus (loc. cit.) devotes much attention to the subject of ovarian metastases from gastric carcinoma and emphasizes the importance of surface infection. This idea had been previously advanced by von Recklinghausen (47) and by Mueller (48) and also is strongly advocated by Polano (loc. cit.).

In our case large sections including the entire ovary, tubes, and part of the uterus were made. The sections were very instructive and showed the masses of tumor cells to be largest and most numerous in the ovaries. In the tubes also there were small collections of tumor cells but the striking picture here was the marked proliferation of the connective tissue elements. In the uterus no tumor cells were found. This picture suggests very strongly that the tumor invasion began in the ovaries and that the tumor cells were carried by the draining lymphatics toward the uterus lodging in the tubes but apparently not reaching the uterus itself.

In our case a metastasis by means of surface infection suggests itself. The tumor cells were demonstrated in the wall and in the serosa of the stomach, and there were a few small tumor nodules present in the jejunum. This might indicate that the tumor cells penetrated the wall of the stomach, became free in the peritoneal cavity and then were carried down upon the ovaries. It is hard to conceive of a metastasis by way of the lymph stream since the flow of lymph is away from the ovaries and not toward it and also since the abdominal lymph glands showed no involvement. At first it seemed difficult to assume a metastasis by way of the blood stream since no metastases were apparent in any other organs except in the intestines. Extensive study, however, of sections from the autopsy showed the occasional presence of groups of characteristic tumor cells in the pulmonary blood-vessels. Also in a few small areas these cells had grown into the lung tissue and formed minute microscopic metastases.

To explain why there is a marked infection of the ovaries and not of the other organs appears somewhat difficult. Schlagenhaufer (loc. cit.) has called attention to the fact that in the majority of cases metastatic ovarian carcinomata occur at an age when the ovary is still functioning. Stone (loc. cit.) also believes that the changes taking place during ovulation make the ovary more liable to surface infection.

The enlargement of the pituitary gland in our case was very striking and its weight was greatly increased. Microscopically it showed some increase in size of the individual cells, suggesting the picture of hyperactivity described for this organ. Schmincke (49) has described a case of ovarian carcinoma secondary to a carcinoma of the intestine in which there was lactation with a "pregnancy hypertrophy" of the pituitary gland. It is probable that the hypertrophy of the pituitary in our case was similar to that of pregnancy and due to some ovarian stimulus produced by the tumors of both ovaries.

CONCLUSIONS

A review of the literature shows that, including our own case, at least 55 cases of Krukenberg tumor have been reported. To this number may be added 8 probable cases.

Histologically the tumor is essentially a carcinoma. Some features suggest a fibrosarcoma but if this term is to be used, it would be more accurate to reverse the order employed by Krukenberg and call it a carcinoma mucocellulare fibro-sarcomatodes.

This tumor is in the majority of cases secondary to a carcinoma of the stomach or of the intestines. The question of its primary or secondary nature can only be determined definitely by autopsy or palpation at operation. Eighteen cases were collected in which the presence of a primary growth in the gastro-intestinal tract was demonstrated.

Five cases have been reported in which no primary tumor of the stomach or intestines was observed at autopsy. Three of these may

Fig. 1. Ovaries, tubes and uterus. Note bilateral tumors of both ovaries.

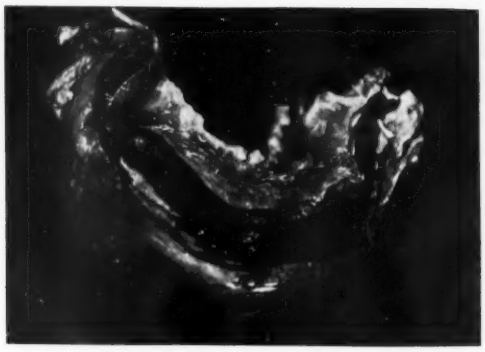

Fig. 2. Stomach with markedly thickened wall.

be open to the objection that no microscopic examination of the stomach was made. Two of the cases at least meet every apparent objection and can not be regarded as other than primary ovarian tumors.

In 43 cases where the data was completed, the Krukenberg tumor was bilateral in 39 instances (90 per cent).

Surface infection of the ovaries may explain in some cases the manner of metastasis. In our case, however, the demonstration of tumor cells in the pulmonary blood-vessels, suggests very strongly a spread by way of the blood stream. The tumor occurs in the majority of cases during the period of sexual activity — the average age was 36 years.

The statement sometimes made that the Krukenberg tumor is relatively benign is not borne out by the subsequent history of these patients. All of the cases reported in the literature where the later course was known died.

CASES CONSIDERED AS PRIMARY

CASE 1. Reported by Krukenberg in 1896. Patient age 26, had bilateral tumor. Autopsy revealed carcinoma of the stomach.

CASE 2. Reported by Krukenberg in 1896. Patient age 43, no autopsy performed. Subsequent history not reported.

CASE 3. Reported by Krukenberg in 1896. Patient age 54, had bilateral tumor. Autopsy revealed a normal stomach.

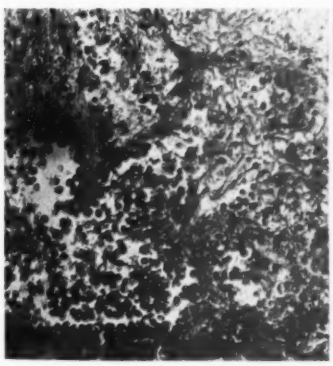

Fig. 3.

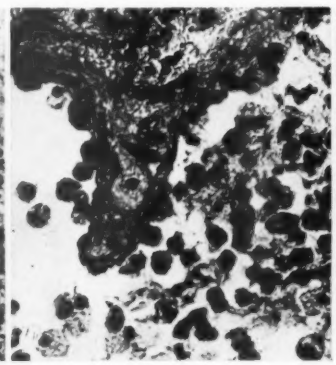

Fig. 4.

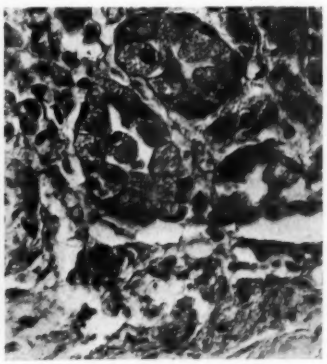

Fig. 5.

Fig. 3. Section of tumor in right ovary. Hæmatoxylin and eosin stain.

Fig. 4. High power magnification of Fig. 3. Shows the large clear tumor cells with eccentrically placed nuclei.

Fig. 5. Photomicrograph of two glands of the stomach mucosa. Shows a transformation of the cells of the glands into tumor cells. Hæmatoxylin andeosin stain.

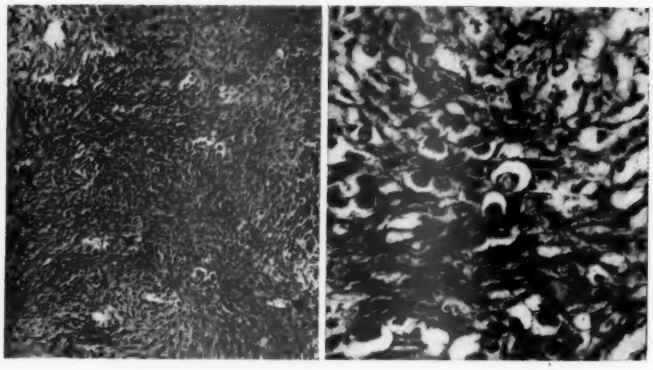

Fig. 6. Fig. 7.

Fig. 6. Photomicrograph of a section from the enlarged lymph gland at the hilus of the stomach. The picture suggests a fibrosarcoma. Hæmatoxylin and eosin stain.

Fig. 7. Photomicrograph of the same section as Fig. 6 with a higher magnification. This shows clearly the large clear tumor cells in a dense connective-tissue framework. Hæmatoxylin and eosin stain.

Case 4. Reported by Krukenberg in 1896. Patient age 25, had a bilateral tumor.

Case 5. Reported by Krukenberg in 1896. Patient age 35, had a bilateral tumor, gave a clinical history of "stomach trouble." No autopsy performed.

Case 6. Reported by Sternberg in 1896. Patient age 32, had a bilateral tumor. Autopsy revealed a normal stomach, and metastases to the bone-marrow.

Case 7. Reported by Schenk in 1904. Patient age 27, had a bilateral tumor, gave a clinical history of belching and loss of appetite. Autopsy revealed a normal stomach.

Case 8. Reported by Orthmann in 1905. Patient age 48, had a bilateral tumor. Died, no autopsy performed.

Case 9. Reported by Glockner in 1905. Patient age 38, had a bilateral tumor. Autopsy revealed a normal stomach and metastases to the bone-marrow.

Case 10. Reported by von Rosthorn in 1906. Patient age 41, had a bilateral tumor, gave a clinical history of vomiting. Autopsy revealed numerous metastases and an apparently normal stomach.

Case 11. Reported by Fischer in 1909. Patient age 31, had a bilateral tumor, gave a clinical history of pain in stomach. No autopsy performed and no subsequent history given.

Case 12. Reported by Fischer in 1909. Patient age 30, had a bilateral tumor. At operation no stomach tumor was felt. No autopsy performed and no subsequent history given.

Case 13. Reported by Krueger in 1909. Patient age 19, had a bilateral tumor. Patient living five months after operation with no metastases apparent.

Case 14. Reported by Outerbridge in 1911. Patient age 58, had a bilateral tumor. At operation the stomach was normal. Died. No autopsy performed.

Case 15. Reported by Schwarz in 1913. Patient age 30, had a bilateral tumor. Died. No autopsy performed.

Case 16. Reported by Foulkrod in 1916. Patient age 39, had a bilateral tumor, gave a clinical history of vomiting. Second operation showed carcinoma of the stomach. Carcinoma of stomach not noted at the first operation.

CASES CONSIDERED AS SECONDARY

Case 1. Reported by Tiburtius in 1899. Patient age 43, had a bilateral tumor. Autopsy revealed a carcinoma of the pylorus.

Case 2. Reported by Tiburtius in 1899. Patient age 48, had a bilateral tumor, gave a clinical history of pain in the abdomen. Autopsy revealed a carcinoma of the stomach.

Case 3. Reported by Kraus in 1901. Patient age 30, had a bilateral tumor. Autopsy revealed a carcinoma of the cæcum.

Case 4. Reported by Wagner in 1902. Patient age 69, had a bilateral tumor. Autopsy revealed a carcinoma of the stomach.

Case 5. Reported by Schlagenhaufer in 1902. Patient's age not known, had a bilateral tumor. Autopsy revealed a carcinoma of the stomach.

Case 6. Reported by Schlagenhaufer in 1902. Patient's age not known, had a bilateral tumor. Carcinoma of the stomach felt at operation. No autopsy performed.

Case 7. Reported by Stauder in 1902. Patient age 37, had a bilateral tumor, gave a clinical history of vomiting. No autopsy performed.

Case 8. Reported by Stauder in 1902. Patient age 26, had a bilateral tumor. Autopsy revealed a carcinoma of the stomach.

Case 9. Reported by Stauder in 1902. Patient age 39, had a bilateral tumor, gave a clinical history of "stomach trouble." Died. No autopsy performed.

Case 10. Reported by Glockner in 1904. Patient age 48, had a bilateral tumor. Carcinoma of the stomach felt at operation. No autopsy performed.

Case 11. Reported by Glockner in 1904. Patient age 37, had a bilateral tumor. Autopsy revealed a carcinoma of the stomach.

Case 12. Reported by Amann in 1905. No data given.

Case 13. Reported by Amann in 1905. No data given.

Case 14. Reported by Amann in 1905. No data given.

Case 15. Reported by Amann in 1905. No data given.

Case 16. Reported by Sandrock in 1906. Patient age 32, had a bilateral tumor, gave a clinical history of having vomited blood. Died. No autopsy performed.

CASE 17. Reported by Stickel in 1906. Patient age 26, had a bilateral tumor. Autopsy revealed a carcinoma of the stomach.

CASE 18. Reported by Burdsinsky in 1908. Patient age 26, had a bilateral tumor. Autopsy revealed a carcinoma of the stomach.

CASE 19. Reported by Ulesko-Stroganoff in 1910. Patient age 49, had a bilateral tumor. Gave a clinical history of vomiting. No autopsy performed. Subsequent history unknown.

CASE 20. Reported by Ulesko-Stroganoff in 1910. Patient age 30, had a bilateral tumor, gave a clinical history of vomiting. No autopsy performed. Subsequent history unknown.

CASE 21. Reported by Ulesko-Stroganoff in 1910. Patient age 39, had a bilateral tumor. Gave a clinical history of vomiting. No autopsy performed. Subsequent history unknown.

CASE 22. Reported by Cohn in 1910. Patient age 21, had a bilateral tumor, gave a clinical history of vomiting. Autopsy revealed a carcinoma of the sigmoid.

CASE 23. Reported by Cohn in 1910. Patient age 36, had a bilateral tumor. Carcinoma of the stomach felt at operation. No autopsy performed.

CASE 24. Reported by Cohn in 1910. Patient age 39, had a bilateral tumor. No autopsy performed.

CASE 25. Reported by Cohn in 1910. Patient age 25, had a tumor of the left ovary. Autopsy revealed œdema of the colon.

CASE 26. Reported by Hussy in 1911. Patient age 47, had a tumor of left ovary, gave a history of an operation in 1906 for cancer of stomach. No autopsy performed.

CASE 27. Reported by Kuhlhoff in 1912. Patient age 27, had a bilateral tumor, gave a clinical history of having vomited blood. Died. No autopsy performed.

CASE 28. Reported by Jackson in 1913. Patient age 38, had a bilateral tumor, gave a history of loss of appetite. Operation disclosed a carcinoma of the stomach. Died. No autopsy performed.

CASE 29. Reported by Mandl in 1913. Patient age 42, had an unilateral tumor. Carcinoma of the pylorus seen at operation. No record of autopsy performed.

CASE 30. Reported by Hall in 1913. Patient age 32, had a tumor of the right ovary, gave a clinical history of vomiting. Autopsy revealed a carcinoma of the pylorus.

CASE 31. Reported by Bondy in 1914. No data given.

CASE 32. Reported by Bondy in 1914. No data given.

CASE 33. Reported by Bondy in 1914. No data given.

CASE 34. Reported by Bondy in 1914. No data given.

CASE 35. Reported by Stone in 1916. Patient age 28, had a bilateral tumor, gave a clinical history of vomiting. Died. No autopsy performed.

CASE 36. Reported by Stone in 1916. Patient's age unknown. Autopsy revealed a carcinoma of the stomach.

CASE 37. Reported by Stone in 1916. No data given.

CASE 38. Reported by Reel in 1917. No clinical data given.

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CARCINOMA OF THE UMBILICUS

WITH A REPORT OF TWO CASES

BY FRANK WARNER, M.D., F.A.C.S., COLUMBUS, OHIO

CARCINOMA of the umbilicus, either as a primary or secondary neoplasm, is of such infrequent occurrence as to make desirable the careful study of a case when encountered. The majority of the cases are secondary in character; out of 94 cases of cancer of the umbilicus collected from the literature by Cullen,[1] 72 were secondary and 22 primary carcinomata. Of the secondary cases, all were derived from some primary, malignant epithelial neoplasm of the intra-abdominal or pelvic organs. With so great a difference in the ratio of primary to secondary carcinomata of the umbilicus, when a malignant growth of this part is encountered, the presumption is that the cancer is secondary to some abdominal or pelvic growth, though it may not be possible to demonstrate this fact at the time of the primary examination.

Cancer of the umbilicus seems to be about equally distributed between the two sexes.

[1] Thomas S. Cullen. Umbilicus and Its Diseases.

Of the cases of primary carcinoma of the umbilicus, two occurred before the age of 40, the greatest number between 50 and 60 years of age. Here, as elsewhere, cancer is not a disease of the young.

As the majority of the cases of carcinoma of the umbilicus is secondary to intra-abdominal and intrapelvic epithelial neoplasms, the age at which these respective growths most frequently occur is naturally the age at which the carcinoma attacks these various organs, viz., in middle or late life.

Of the cases of cancer of the umbilicus secondary to intra-abdominal or pelvic growths, the seat of origin of the greatest number, twenty-seven, was from the stomach. The gall-bladder was the primary source of the malignant neoplasm in six cases, the ovaries in nine, the uterus in two, the intestines in four, the rectum in one, and twenty-three from some abdominal tumor the exact origin of which was unknown, as neither operation nor postmortem was made.

The vast majority of the cases which were primarily in the umbilicus, were of the adenocarcinomatous type; a very few were of the squamous-celled variety.

Wohl[1] reported a case of carcinoma of the umbilicus which was secondary to one of the transverse colon.

The embryology of the fœtus is interesting and essential in understanding the development of an adenocarcinoma occurring primarily in the umbilicus. In the very early days of fœtal life, the yolk sac is attached to the ventral surface of the fœtus. The dorsal portion of the yolk sac forms the primitive midgut, which later extends forward to form the foregut and caudally to form the hindgut. The yolk sac now undergoes such a narrowing at the ventral surface as to form the omphalomesenteric duct, which communicates with the intestines and is lined with the same type of epithelium. Later, as the amniotic cavity enlarges, the yolk sac becomes smaller, and the omphalomesenteric duct and the body-stalk fuse, forming the umbilical cord. Later, the duct is obliterated and finally disappears. However, in some instances, remnants of this epithelial duct are left behind, which explains why adenocarcinoma of the umbilicus may develop as a primary malignant disease.

The adenocarcinomata secondary to intra-abdominal neoplasms give, in a general way, the type of glandular structure that composes the abdominal organ in which the primary growth is situated. The umbilical tumor may fail to differentiate clearly the type of cells from which it is derived, or the form of glandular structure, but both are usually sufficiently formed, unless very rapidly growing, so one can make a satisfactory estimate of the cell type and the gland origin.

It is not always easy to see just what line of lymphatics are employed for a transmission of cancer cells from the deeper abdominal organs to the umbilicus. But this understanding has been made less difficult since Hanley has shown us that cancer cells may extend into lymph channels by continuous growth, and that this growth may take a direction quite against the lymph current.

[1]M. G. Wohl. Boston M. & S. J., 1917, Sept., 442.

Fig. 1. Case 1. Cancer of the umbilicus secondary to carcinoma of the rectum.

If this thought is accepted, it makes clear the method of secondary transmission of cancer cells to some distant part; otherwise the manner in which these detached cells reached these parts by simply being carried in the normal flow of the lymph currents, could not be so readily understood.

There are two methods of studying the anatomy of lymph vessels, the clinical and the anatomical. The latter method has shown us clearly, what was supposed previously, that the superficial lymphatics of the umbilicus drain, in its upper part, into the axillary glands, and, in its lower, into the inguinal glands. While the deeper lymphatic drainage has not been so clearly demonstrated, yet, recently, anatomists have shown that there is a connection between the pelvic lymphatics and the umbilicus. Clinically, it is clearly manifest that the lymphatics of the entire gastro-intestinal tract and other abdominal organs, have some communication with the umbilicus; otherwise it would be difficult to explain, in our present state of knowledge, the transmission of cancer cells from these organs to the umbilicus.

While metastases of cancer cells occur in some situations through the veins and the arteries, it seems scarcely possible that a growth in the umbilicus, secondary to an intra-abdominal tumor, could be induced through other channels than the lymphatics.

The following case of cancer of the um-

Fig. 2.

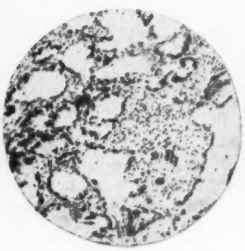

Fig. 3.

Fig. 2. Case 1. Cancer of the rectum which metastasized to the ileum and umbilicus.

Fig. 3. Case 1. Cancer of the ileum showing colloid degeneration like that in the rectum.

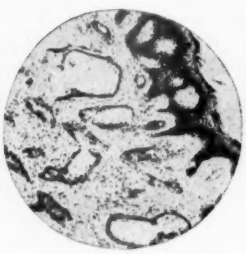

Fig. 4.

Fig. 5.

Fig. 4. Case 1. Carcinoma of the umbilicus secondary to cancer of the rectum.

Fig. 5. Case 1. Cancer of the rectum showing colloid degeneration which appeared in the metastasized tumors.

bilicus, secondary to a carcinoma of the rectum, occurred in my practice. But a single case was found in the literature by Cullen; consequently, this case of my own adds at least a second one since the publication of his recent book on this subject.

On the 23rd day of May, 1917, a male patient, 68 years of age, consulted me on account of a slight tumor which had appeared in the umbilicus, one year before. On inquiry, I learned that for a period of a year or more he had had occasional attacks of pain and soreness in the rectum, associated with attacks of diarrhœa, followed by constipation. Lately, a continuous sanious discharge from the anus was an added feature of the history. An examination of the umbilical mass showed it to be one inch in diameter, hard and attached to the deeper wall structure. It was a painless mass, largely free from soreness. A digital examination of the rectum revealed a hard mass in its upper part which was clearly compromising, to a large extent, the caliber of that organ. The diagnosis was made of carcinoma of the rectum with a secondary cancer of the umbilicus. An operation was not undertaken because of the extensive involvement of the primary growth in the rectum and the secondary metastasis in so remote a part. Besides, the history of all these secondary malignant involvements of the umbilicus is that death usually promptly ensues.

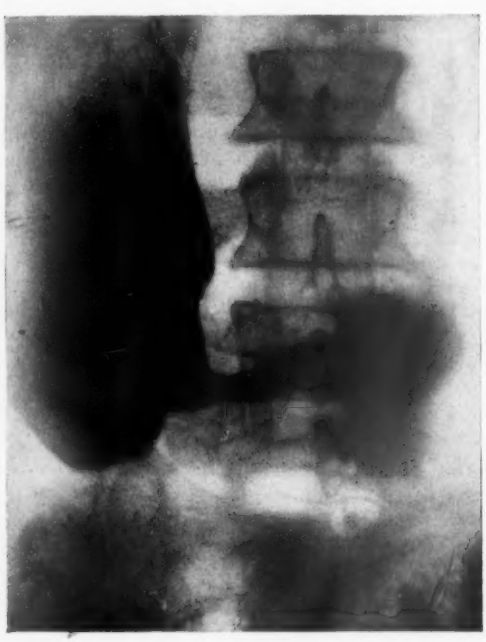

Fig. 6. Case 2. Cancer of the pyloric end of the stomach. A secondary nodule formed a carcinoma of the umbilicus.

Six weeks from the time I first saw him, an obstruction of the bowels occurred by reason of the rectal growth. An inguinal artificial anus of the sigmoid was made and the patient succumbed twelve days after the operation.

The patient died July 17, 1917, and a postmortem was held the following morning. A hard mass, measuring one inch in diameter, was present in the umbilicus. The rectum was substantially occluded by a scirrhus mass in its upper diameter, with adjoining infiltration of a like firm material in the surrounding tissues. From its extent and size, the upper rectum seemed to be the point of origin of the carcinoma. A rather firm mass was present in the region of the head of the colon, the exact seat of its origin being later worked out in the laboratory. There were a few slightly enlarged lymphatic nodules in the mesentery, but none in either the axilla or groins. The liver contained numerous necrotic areas of infection, resembling, at first sight, secondary cancerous nodules. The spleen was quite perceptibly enlarged, though no nodules were present in it. The kidneys were slightly swollen,

Fig. 7.

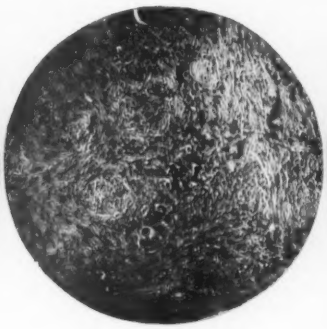

Fig. 8.

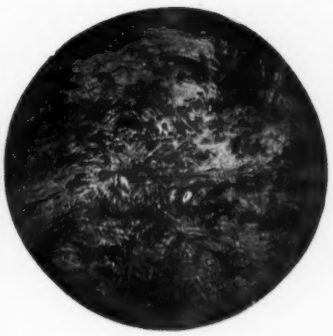

Fig. 9.

Fig. 7. Case 2. Showing tubular arrangement of epithelium simulating the glands of gastric mucosa.

Fig. 8. Case 2. Showing abundance of fibrous tissue surrounding masses of epithelium.

Fig. 9. Case 2. Showing more clearly the cell group illustrated in Fig. 7.

showing some acute nephritis. The heart was normal in appearance with the exception that the coronary arteries presented clear evidence of arteriosclerosis, and the inner walls of the heart were the seat of a few fibrinous plaques of an old character. While normal, the right lung was held down by adhesions at the apex. The iliac artificial anus, made twelve days before death, had formed very firm adhesions, which were holding the colon in position.

The pathological examination of the various specimens demonstrated that adenocarcinomatous masses were present in three situations: in the rectum, in the ileum near the head of the colon, and in the umbilicus. All three of the masses were of the same character, and the tendency in all was to form glandular structure similar to that of the normal rectum. The epithelial cells in the neoplasm were of either a cuboidal or cylindrical type. Many of the nests of epithelial cells in the three growths had undergone gelatinaform or colloidal degeneration, placing the growths in the classification of colloidal adenocarcinomata.

There was no difficulty in excluding the growth in the wall of the ileum as the primary one, for the neoplasm was just beneath the peritoneum, penetrating slightly the musculature of the intestine, but not reaching the submucosa, let alone the mucosa; consequently there were no epithelial cells in this situation from which the cancer could have taken its origin. It was not so simple to differentiate between the rectum and the umbilicus as the point of origin of the original growth. From the fact that the neoplasm in the rectum was much larger, more deeply and broadly infiltrated, and showed more extensive colloidal degeneration, and was composed of a glandular structure and cell type similar to this organ, the conclusion was drawn that the umbilical growth which was of similar structure and cell type, with less colloidal degeneration, was secondary to that of the rectum. Thus the rectum was the original seat of the carcinoma, which subsequently metastasized to the wall of the ileum and to the umbilicus.

It seemed a peculiar coincident that a second case of cancer of the umbilicus should have come into my hands three months after the preceding case just reported, when one comes to reflect that in ten years, from 1830 to 1840, in 9,118 cases of cancer occurring in Paris and two *arrondissements*, but two cases of cancer of the umbilicus occurred, and but ninety-four cases of cancer of the umbilicus are reported from the literature by Cullen.

Mr. G., age 54, was referred to me by Dr. Roll K. Markwith, of the Protestant Hospital, this city, on the first day of September, 1917. The patient had noticed a little lump in the umbilicus but a week or two previously. The lump had felt sore rather than painful; but the thing for which he sought relief was gastric disturbance which he had noticed for the past six or seven months.

His appetite was poor and he had lost some 20 pounds in weight since he had noticed the stomach disturbance. Vomiting had occurred a few times, but was not a prominent feature of his symptoms. Nineteen years before, he had some stomach disturbance which gave the symptom-complex of ulcer of this organ, but the trouble had settled down for all these years until the recent trouble manifested itself.

An examination showed the presence of a hard, firm mass in the umbilicus, which mass was red and tender on pressure, but not ulcerated. At the pyloric end of the stomach was found a large, hard mass, not very freely movable. The stomach contents

showed an absence of hydrochloric acid, but such a considerable amount of blood as to suggest the probability of the mucosa being ulcerated. The X-ray showed not alone the mass, but also the fact that the stomach was obstructed at its outlet.

The entire umbilicus was removed for examination, but the stomach neoplasm was too extensively infiltrated into surrounding structures to permit of its successful removal.

The pathological examination of the umbilical tumor showed it to be an adenocarcinoma, undoubtedly secondary to carcinoma of the pyloric end of the stomach. The epithelial tubules in the neoplasm presented much the same appearance as those in the gastric or intestinal mucosa, but, of course, a cancer arising primarily from the remnants of the omphalomesenteric ducts gives much the same appearance. From the fact that the stomach symptoms were noticed by the patient long before he noticed the umbilical neoplasm, would lead one to conclude, from the clinical standpoint, that the umbilical growth was secondary to that of the stomach. The size of the stomach neoplasm, the extent of infiltration and its scirrhus nature, would lead one to conclude that it had been in existence some time; much longer than the umbilical tumor had probably existed.

The prognosis of all the primary cases of carcinoma of the umbilicus is good provided an operation is undertaken before infiltration is beyond the reasonable reach of an operation to remove both the growth and the locally infiltrated areas; the outlook, however, is very unfavorable in secondary cancer of this situation, because the infiltration is likely to have extended in other directions than the umbilicus; the original abdominal neoplasm having metastasized into other regions of this cavity, as in the case here reported by me. When an umbilical carcinoma has metastasized from some intra-abdominal growth, the patient usually quickly succumbs.

The treatment, to be efficient, must be undertaken early in the case of the primary cancer of the umbilicus; in those of a secondary type, the disease has usually advanced beyond the pale of hope. If an operation is done, sufficiently extensive dissections must be made to give some assurance of a complete removal of the various areas.

It needs to be vigorously emphasized that if a mass is encountered in the umbilicus, it should not be dealt with as an independent tumor without canvassing with the greatest thoroughness the probability of its being a secondary malignant metastasis from a primary cancer of some intra-abdominal or pelvic organ. Just such a case is now in my hands, in which there is a tumor of the pyloric end of the stomach and one in the umbilicus.

At last, the treatment of cancer of the umbilicus, either primary or secondary, is not different from the cancer problem in general. To be successful in its treatment, an operation must be made early enough to ensure the complete removal of every vestige of the cancer cells which are continually undergoing mitoses. Every case of cancer is local at the outstart and if removed at that early period of its history, no recurrence will take place; if not operated on until extensive infiltrations have taken place, little hope can be entertained of a cure.

The X-ray and radium, while helpful in retarding the growth in cases of inoperable cancer, and in curing some very early, superficial carcinomata, have no place in the usual treatment of malignant neoplasms; the knife alone stands as the best form of treatment yet devised for cancer in any situation; if undertaken early, before infiltrations have occurred, the results are sure and certain.

I am indebted to Dr. Ernest Scott, Professor of Pathology, Ohio State University, for his verifications of my findings in the various specimens examined.

EXTRAPERITONEAL CÆSAREAN SECTION IN CERTAIN INFECTED CASES WITH THE CARREL AFTER-TREATMENT

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TRUE extraperitoneal hysterotomy has been performed so seldom in this country, that for the operative indications to be fully appreciated, it seems best to describe the cases where its adoption appears essential to accomplish certain results; namely, a living mother capable of bearing other children, and a living child in a patient already infected, where the only other possible choice is a craniotomy on the viable fœtus, or an amputation of the uterus supravaginally, treating the stump extraperitoneally, in which case, as a matter of course, no further pregnancy can ever occur.

J. Whitridge Williams, in the November number of the *Johns Hopkins Bulletin*, publishes an article entitled, "A Histological Study of Fifty Uteri Removed at Cæsarean Section." In this he has contributed most important data on the placental site and the details of placental separation, but of even more interest were the findings of inflammatory processes in the decidua. So pertinent were they to the subject of this paper that I quote him in full:

> In the first section of the article attention was directed to the fact that in 8 instances the indication for the removal of the uterus consisted in frank intrapartum infection. In all these cases, microscopical examination revealed the existence of acute inflammatory changes in the decidua. In every instance, the process was most intense in the lower uterine segment, thus indicating that the infection had ascended from below. In a number of instances the placental site was involved in the process, and there is every probability that a considerable number of the women would have presented severe, if not fatal, infection in the puerperium had the uterus not been removed, and thus additional evidence is afforded of the wisdom shown in adopting a radical course. In addition to the eight cases just mentioned, definite inflammatory changes were noted in twelve other specimens. These were all derived from patients who had been examined by outside physicians before admission to the service, or in whom, for one reason or another, interference had been deferred until late in labor. In a number of these specimens appropriate methods of staining enabled us to demonstrate the presence of streptococci in the tissues, but in others, such bacteriological evidence could not be adduced.
>
> The fact that inflammatory changes were present in 40 per cent of our specimens is very impressive and serves to demonstrate anew the dangers of conservative cæsarean section when performed at any other than the optimal time, namely, at an appointed date during the last days of pregnancy or within a few hours after the onset of labor in patients who have recently been examined only by those who observe an appropriate technique. In this group of cases, at least, I feel that the disadvantages incident to permanent sterilization have been more than compensated for by the increased saving of material life resulting from the radical operation.

In our series of classical cæsarean section, we can recall at least three cases where before the operation, there were no signs of infection or history of interference and yet they promptly died of a rapid septic infection with general peritonitis. This might have been laid to poor technique but for the fact that cases before and after, under the same conditions, made uninterrupted recoveries.

At the present time the authors are limiting the use of the extraperitoneal operation to cases that present the following combination of conditions; a living child in a patient who is presumably infected and cannot be delivered of that living child through the normal passages.

It is our belief that these conditions contra-indicate: first, craniotomy or other vaginal interference, for the operation of craniotomy was performed 240 times in the service of the Lying-In Hospital in 60,878 births, and of the 240 mothers operated upon, 30 or 12.5 per cent died, with naturally a fœtal mortality of 100 per cent; second, classical cæsarean section; third, amputation of the uterus after cæsarean; fourth, transperitoneal cæsarean section.

We feel that it is virtually impossible to have the peritoneal cavity open and not to infect it when the septic contents of the

uterus must necessarily invade everything in the immediate surroundings at the time of the removal of the child and placenta from the uterine cavity, for the liquor amnii will most surely find its way to the general peritoneal surface in such quantity as to certainly infect it.

In the autumn of 1914, the author returned to the United States from a visit to the principal centers of clinical medicine in Italy, Switzerland, Germany, Denmark, England and France, and became deeply impressed with the work being done in obstetric cases where the mother had become infected, the unborn child still alive, and the possibility of delivering this child by way of the natural passages out of the question.

At that time, Frank and Selheim had done most of the work along this line and their results were most interesting.

About the same time, Hirst, of Philadelphia, published his report on "Modern Extraperitoneal Cæsarean Section" and in this article advocated a transperitoneal method that was extremely easy to do by suturing the peritoneum at the edge of the abdominal wound to the edge of the uterine peritoneum before opening the uterine cavity. At the same time it was claimed that this isolated the general peritoneal cavity from any infection that might arise from the removal of the child through the uterine wound, accompanied as it always is, with a great gush of liquor amnii and uterine contents, all more or less infected.

Inspired by his success, Markoe performed five of these transperitoneal operations:

CASE 1. Hopeless case of toxæmia of pregnancy, verified by autopsy. The patient had been in the hands of a midwife and two physicians. In this case the mother died in one and one-half hours after operation and the child was stillborn.

CASE 2. A justominor pelvis, who had been in labor eighteen to twenty hours and whose private physician had made innumerable attempts at delivery, before sending her to the hospital. A culture from the vagina was taken when this patient was admitted, and showed colon bacilli. On the sixth day the abdominal wound broke down and a culture from this showed staphylococcus albus. Mother and child were discharged well.

CASE 3. Contracted pelvis with a history of interference before entering the hospital. This patient was infected evidently, but cultures and smears were not taken. A histological examination of a section of the endometrium removed at the time of the operation, showed an acute exudative inflammatory process. Her future course was an extremely stormy one and she died on the third day. Postmortem inspection of the wound showed a general peritonitis, with an infection by hæmolytic streptococci and colon bacilli. The child lived fourteen days and died of malnutrition.

CASE 4. Was again a case of contracted pelvis in which her home physician had tried for three days, every method of delivery and then sent her into the hospital. The contracted pelvis and the certain evidence of a living child induced the selection of a transperitoneal cæsarean, after the method of Hirst. This was done and the patient made an uneventful recovery but the child survived only two hours. It weighed 4100 grams.

CASE 5. Was similar in history to the last case but with no sign of infection. The wound healed primarily and both mother and child were discharged well.

This is the summary of the five cases, all delivered by opening the lower abdomen, suturing the uterine and parietal peritoneum together, so as to wall off the general cavity, before opening the uterus and removing the child.

One mother died from toxæmia and one from sepsis and the three children survived, but to the writers the only case which showed the danger of the operation was Case 3. Here was an unknown far advanced infection of the endometrium, which at the time of the operation, undoubtedly, leaked through the unavoidable openings made by the sutures, and no matter how carefully they were applied, this could not be prevented. Therefore, after careful consideration, it was decided that in future, in all such cases the true extraperitoneal operation as done by Frank and Selheim would be performed. Accordingly on January 16, 1915, the first of these operations was successfully carried out. In the September number of the *Bulletin of the Lying-In Hospital*, Markoe published a report of four cases and a summary of them shows the following:

CASE 1. Mrs. A. B., age 33, VIII-para, born in Italy. Admitted to hospital on January 16, 1915. The patient was examined under ether. The head was above the brim. It was decided that she could not be delivered vaginally as the pelvis was generally contracted and flat. On the afternoon of Janu-

ary 16th, the patient was again etherized and the abdomen opened in the median line from the pubes to the umbilicus. After passing through the fascia and separating the recti muscles, the bladder was exposed but not opened, and found to contain a small amount of urine, which was of a decided advantage. By blunt dissection, the fascia was separated from the peritoneum, and the anterior wall of the bladder laid bare almost down to the urethra. Moderate bleeding occurred from the plexus of veins just posterior to the symphysis. The peritoneum at the fold formed by the juncture of the parietal and visceral layers was then dissected up. The bladder was loosened posteriorly and carried over to the right of the median line. It was then held out of the way by the fingers. The peritoneum was next dissected up farther on the anterior wall of the uterus so as to give sufficient room to extract the child. On the anterior wall of the uterus, a small vein was caught and tied. This was the only vessel of any size on the anterior wall of the lower uterine segment. All the dissection was done by the use of gauze and fingers. An incision 10 centimeters in length was then made in the lower uterine segment. The uterine wall was very thin and not very vascular. Because of this thinness, a small cut was made in the baby's scalp. Using the left blade of the forceps as a vectis, the head was raised through the incision and the body of the child delivered. The cord was clamped and cut. The child weighed 5,810 grammes. There was a large amount of meconium in the uterine cavity. The placenta was delivered manually. The uterus was relaxed and filled with blood, but by pressure through the abdominal wall and packing the fundus with gauze, the uterus contracted and the hæmorrhage ceased.

The uterus was then closed with two layers of interrupted sutures of No. 2 chromic gut, after the packing was removed. In freeing the bladder, from its anterior attachments, a space about 3 centimeters deep just posterior to the symphysis remained. In this space was placed a large cigarette drain which was brought out through the lower end of the incision. The bladder was then returned and sutured in place with continuous sutures of No. 1 chromic gut. A rubber tube containing iodoform gauze was placed above the bladder and to the right and brought out just above the cigarette drain. The fascia was closed with interrupted sutures of No. 2 chromic gut, leaving a space for drains. Two silkworm-gut sutures were inserted, one above the other and one below the drains and they were tied in bow knots. The remaining skin was drawn together with skin clips. Culture from uterine cavity through the incision subsequently showed a staphylococcus aureus and a non-hæmolytic streptococcus. The subsequent history of this case was that the child lived three weeks, dying of septicæmia, and upon autopsy, showed the same staphylococcus aureus and non-hæmolytic streptococcus which developed from the culture taken from the uterus of the mother at the time of operation. The mother made a complete recovery and was discharged perfectly well.

CASE 2. A. Y., age 30; III-para; A. N. 49618. This patient was admitted to the Lying-In Hospital on March 29, 1915, with the following history:

On November 22, 1913, the patient was admitted to the hospital. She was delivered of a living child by the author by a transperitoneal cæsarean section after outside interference by midwives and doctors. At that time the abdominal wound broke down but it did not involve the peritoneal cavity and the woman made an uneventful recovery. In March, 1914, she had a three months' abortion and on March 28, 1915, notwithstanding the fact that she had been warned to come to the hospital at the slightest sign of anything being abnormal, she had a severe hæmorrhage accompanied with slight uterine pains, in her own home. So severe was the loss of blood that she fainted at the time. The following day, March 29, 1915, at 2 a.m., she was admitted to the hospital in an intensely anæmic condition, with a rapid pulse. The cervix was immediately packed with iodoform gauze and means were taken to improve her general condition. Later the same day an extraperitoneal cæsarean section was decided upon, in spite of the fact that the patient was in a very serious condition from loss of blood.

Ether was given which the patient took very badly. The abdomen was rapidly prepared with iodine, an incision was made through the former old scar which was removed. The incision was carried through the fascia, just above the symphysis. The old scar tissue was very thick, but after passing through the fascia, the recti muscles were easily separated and drawn aside, the peritoneum being exposed but not opened. The bladder was then loosened from its attachment on the left side and drawn over to the right. There was very little bleeding from the prevesical plexus of veins. The peritoneal fold to the left side was then loosened, drawn up and over to the right side so as to expose the lower zone of the uterus. The uterine wall which was very thin was then opened in the median line coming directly down upon the placenta, with very profuse bleeding and although the delivery was made in the most rapid manner by passing a hand through and grasping a foot, as the breech presented, the baby was easily delivered, but the severe hæmorrhage was caused by the extremely adherent condition of the placenta to the lower uterine segment. These adhesions had to be broken up and the placenta was removed in pieces with great difficulty. The iodoform gauze from the previous night was removed from the vagina and the opening in the uterus was rapidly closed with interrupted chromic catgut No. 2, this suture being then buried, thus securing the incision. The bladder was then drawn over to the left side and attached with plain catgut No. 2. One large cigarette drain was placed back of the symphysis, and one rubber tube down to the fascia. The fascia was closed with

interrupted chromic catgut No. 2. Silkworm-gut sutures were then passed and tied. Michel clips were used in the skin. The patient was in such poor condition at this time, that she was infused with 900 cubic centimeters of normal salt solution, notwithstanding that one and one-half hours after the operation she died from shock, following the hæmorrhage she had had at her own home and the hæmorrhage from the placental site at the time of operation. Transfusion was impossible because of our inability to procure a donor on such short notice, and as she died so soon after operation, the question of septic infection did not enter into the case.

CASE 3. A. G., age 20; I-para; A. N. 50114. The patient was admitted to the Lying-In Hospital on May 1, 1915, with the following history:

The patient was brought to the hospital in an ambulance, in active labor; three fingers' dilated, membranes ruptured, and fœtal head not engaged in the pelvic brim. Examination showed a justo-minor pelvis. Fœtal heart good, 150 per minute, left and below. The patient had been under the care of a midwife, in active labor, for twenty-eight hours. The membranes had been ruptured for twelve hours, with frequent examinations by the midwife and also by two physicians that she had called to help her. An extraperitoneal cæsarean section was decided upon.

Vaginal cultures were taken. The vagina was scrubbed and swabbed out with iodine. A median incision was made just above the symphysis to the umbilicus. The recti muscles were separated and the bladder and peritoneum exposed. The bladder was dissected loose from the left side and drawn over to the right side. The peritoneal fold was drawn up from lower left reflection and the very thin uterine wall exposed and incised. The baby's head was just below the opening. Using one blade of the forceps as a vectis, the head was brought up and out of the incision and the child was delivered. It cried spontaneously. The placenta was removed manually. The assistant followed the uterus down with very slight bleeding. The uterine wall was closed with interrupted chromic catgut No. 2, which was covered over with a running suture. A culture was taken from the incision. The bladder was then drawn over and fastened down to the left side. A cigarette drain was put in the lower end of the incision. The fascia was closed with interrupted chromic catgut No. 3, and four silkworm-gut sutures were placed through the abdominal wall. The skin was closed with Michel clips. The patient was in good condition and there was but slight shock from the operation. She ran some temperature which reached 102° F. on the fourth day after operation, and the abdominal wound broke down but the peritoneal cavity was at no time involved. The baby weighed 4280 grammes and developed a small abscess on the head but under proper care this rapidly healed. Both mother and child were discharged well on the thirty-ninth day. Cultures taken at the time of the operation from the vagina and uterus, showed staphylococcus aureus.

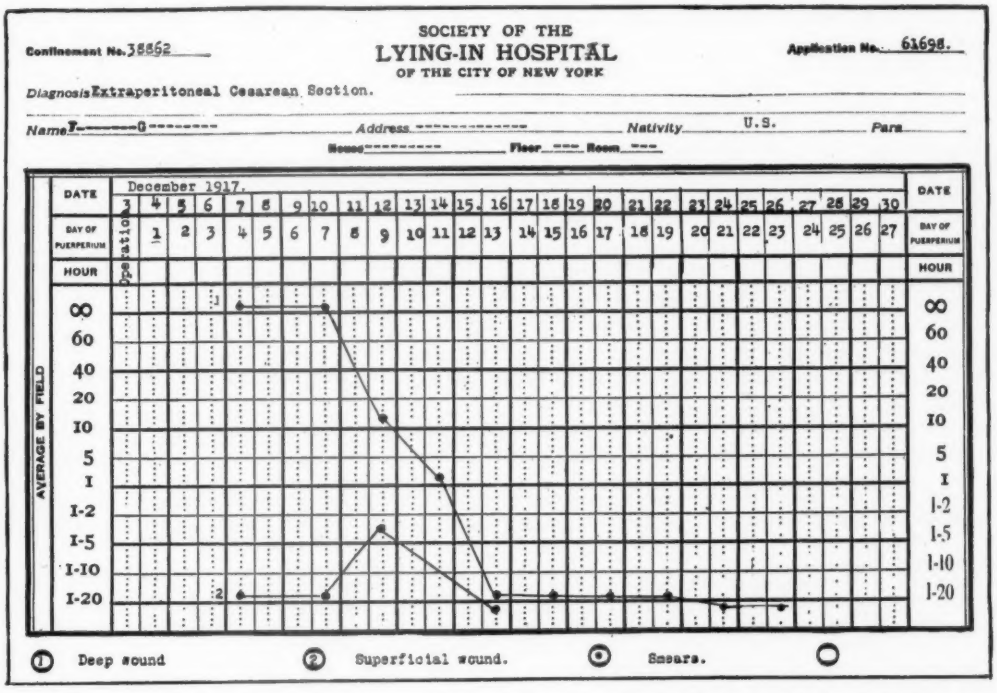
CASE 4. S. F., age 22, Austrian, A. N. 50305. Previous history negative. Admitted to the hospital on May 16, 1915, with a history of prolonged labor (40 hours), under the care of a private physician, who examined her and found a short diagonal conjugate and the head above the brim, and then ruptured the membranes. He called in a consultant who repeatedly examined the patient. She was then sent to the hospital. Upon admission, her temperature was 100° F.; pulse 96; respirations 22. The cervix was four fingers dilated and somewhat thick. The fœtal head was at the brim with large caput projecting into the pelvis. Extraperitoneal cæsarean section was decided upon because of a flat pelvis.

Operation: Ether anæsthesia given. The vagina was thoroughly swabbed with iodine. The abdomen was also prepared with iodine. A median incision was made from the symphysis to the umbilicus. The fascia was split and the recti muscles separated. The bladder and peritoneum were exposed. The bladder was loosened from its attachments on the left side and drawn over to the right side of the median line. The lower reflection of the peritoneum was drawn up from the lower left fold and uterine wall exposed. Several large veins were exposed along the left pelvic wall. As the peritoneum was being dissected up, a small opening was made in the fold which was immediately sutured with fine chromic catgut. The uterine wall incision was made just to the left of the median line. There was very little hæmorrhage. The baby's head was exposed in L. O. P. position. Using a blade of a forceps as a vectis, the head was brought up and through the incision with great difficulty. The baby was delivered in a somewhat anæmic condition. Moderate hæmorrhage. Manual extraction of placenta. A hypodermic injection of ergotol was given. The incision in the uterus was closed with chromic catgut No. 3; interrupted sutures. A running suture of No. 2 chromic catgut, closed these over and buried them. The wound was swabbed with iodine solution. The bladder was drawn over to the left, and sutured with interrupted sutures. The ureter was exposed on the left side for a distance of about 5 centimeters. This was covered over with fascia. Large cigarette drains were placed in the lower angle of the wound. Fascia was then drawn over, overlapped and sutured with chromic No. 3 interrupted sutures. Four silkworm-gut sutures were passed and tied in bow knot. The skin was closed with Michel clips.

Cultures from the uterine cavity and abdominal wound at the time of operation, showed staphylococcus aureus.

The patient was compelled to remain in the hospital for 42 days as the wound was infected and healed slowly.

The baby lived three days and died of atelectasis. Cultures from the heart's blood at autopsy showed no growth.



Bacteriological Chart 1. December 3, 1917. Culture from uterine wound (Case 1, F. G.) shows colon bacillus and nonhæmolytic streptococcus.

The following case is reported by McPherson:

CASE 5. C. S., age 37, I-para, C. N. 36598. Admitted to hospital March 22, 1917. On admission, the patient gave the following history: She had been in labor 30 hours and had had several forceps application by local physicians, without success. On examination here, the patient showed a generally contracted pelvis with a large fœtal head partly molded into the inlet but with greater part of head not engaged; cervix practically fully dilated; baby evidently alive as fœtal heart could be heard.

As it was obviously impossible to extract a living baby through the pelvis an extraperitoneal hysterotomy was done: abdomen prepared with iodine preparation; 6-inch skin incision extending from just below umbilicus to symphysis pubis; fat pushed to one side; fascia opened and recti muscles removed to either side by retraction; space of Retzius exposed and bladder thus brought into view; bladder then pushed aside, upward and to the right, thus exposing vesico-uterine pouch. This was stripped upward to its junction with abdominal peritoneum, so exposing the lower uterine segment, in which head of fœtus was readily palpated. A 5-inch incision was made through the lower uterine segment and the fœtus removed with some difficulty by using the forceps blade as a vectis and aided by hands of operator. The placenta was readily removed. The uterus was closed as usual with interrupted plain No. 3 catgut sutures to inner layer and modified Lambert to outer row. The bladder was put back into place but not fastened down. The abdomen was then closed, leaving a cigarette drain extending through the lower end of the incision area down into the vesical pouch, and a piece of rubber tissue was placed in the fatty layer just beneath the skin. The fascia was closed with interrupted chromic mattress sutures. The skin was closed with silkworm and clips. Dry dressings were placed about the drainage tube and a tight many-tailed binder applied. The patient was returned to the ward in excellent condition.

The fœtus upon delivery failed to respond to any attempt at resuscitation.

Convalescence was uneventful. The wound broke down only in part.

The patient was discharged on eighteenth day. She had at that time a small sinus which healed rapidly. Cultures and smears were not made in this case.

Dissatisfied with the protracted convalescence of these patients, owing to the slow granulation and closure of the wounds, we sought a method which would give us more rapid results. We, therefore, gladly welcomed the plan of Carrel which he has so successfully used on suppurating wounds.

Although weeks of study had nearly fitted us to apply the Carrel-Dakin method to the following cases, they came so unexpectedly that we were unable to install the irrigation tubes at the time of operation, as we now believe should be done in the future cases. Nevertheless we feel that the late introduction of the method has shown such hopeful results that we publish the following three cases.

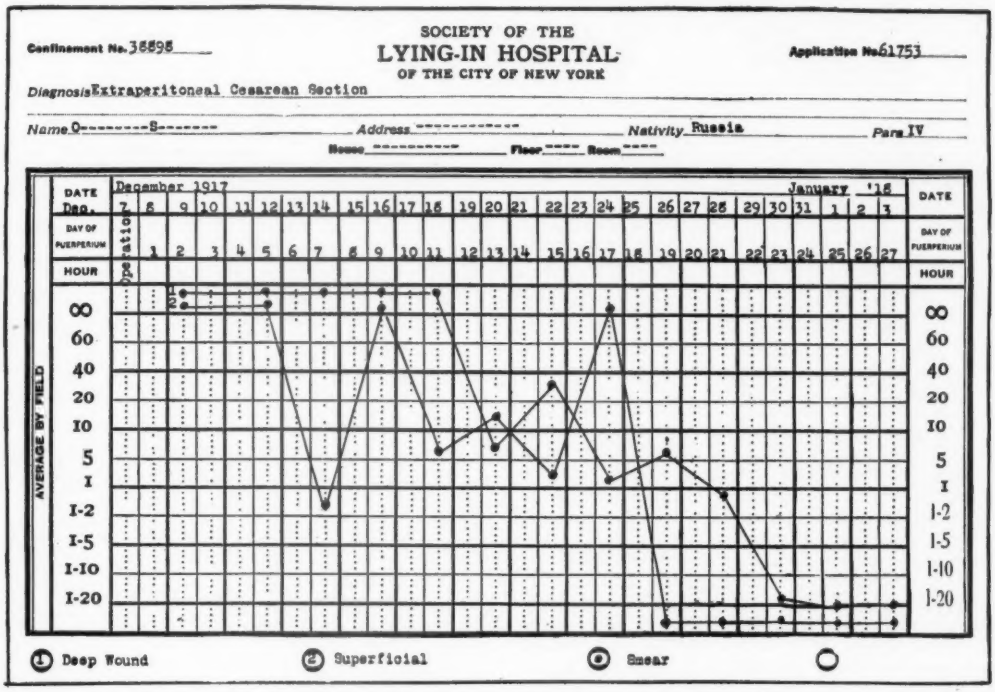
The following are reported by Markoe:

CASE 1. F. G., age 25, U. S., I-para, A. N. 61698. Admitted to the hospital on December 2, 1917, with a history of having been in labor for nearly forty-eight hours.

She sent for her physician but before he came a "nurse" came and examined her three times; then the physician arrived, examined her and left her in charge of the nurse who gave her pills which deadened the severe labor pains that she was having. She states that the nurse made repeated vaginal examinations throughout the night. Early the next morning the physician returned and made two more vaginal examinations and then called a consultant, who made another examination, with the addition of a careful examination of the pelvis and immediately advised that she be sent to the hospital. She was admitted at 9 a.m. on December 2, and stated that the "nurse" had given her two enemata and several doses of quinine. Examination on admission showed a woman considerably exhausted, with an abdomen that contained a full-term uterus; the fœtal heart 140; to the left and below, the pelvic measurements showed the pelvis to be justominor flattened. Vaginal examination, after cultures had been taken, showed the cervix four fingers dilated and soft; the membranes ruptured and most of the liquor amnii drained away. The head had made no progress in engaging at the brim as there was no possibility of it coming through. As soon as she could be prepared, she was taken to the operating room and ether administered to the surgical degree. The abdomen was prepared by the iodine method; an incision 18 centimeters was made in the median line, from the symphysis up to the umbilicus. After passing through the fascia and muscle, great care was taken not to enter the peritoneal cavity but by the use of dry sponges, the tissues containing the bladder were stripped up from the left side until the side of the uterus was reached. This was then further stripped back so that the anterior wall of the cervix was exposed over a large enough space to allow the delivery of the child. The bladder and peritoneum were then held by an assistant, well to the right, the uterus incised and the head of the child brought into view. This was easily extracted by using one blade of the forceps as a vectis and the child quickly delivered. The placenta and membranes were manually extracted and the uterus wound sutured with interrupted chromic gut sutures, after a culture and smear had been taken from the uterine cavity and also from the wound. The bladder and peritoneum, still unopened, were then replaced and held to the left side by one suture; a deep rubber drain was inserted on the left side and the wound closed with interrupted chromic sutures in the fascia, and clips in the skin. Dry dressings were applied. The operation lasted 40 minutes and caused no shock to the patient.

On the following day the canal tubes were, for the first time, introduced into the wound. Although only 26 hours had passed since the operation, the wound contained pus and evidently was not going to heal by primary union. Therefore, there were introduced into the deep pocket on the left side two canal tubes, No. 5, and two on the surface of the wound, which were surrounded by pieces of gauze wet in Dakin fluid. The nurse was ordered to allow a small amount of the fluid to soak into the dressing through the canal tubes. This method did not procure the results desired and on the advice of Doctor Loewe and Major Stewart of the War Demonstration Hospital of the Rockefeller Institute, the nurse was instructed to flush the wound every two hours with 100 cubic centimeters of the Dakin fluid. This gave an immediate clearing of the wound and a marked drop in the number of bacteria per field. So rapid was the healing that the upper portion of the wound was drawn together with a strip of adhesive five days after the operation. Twelve days after the operation all tubes were removed, and the lower wound closed successfully. The patient is up and about and has no discomfort.

CASE 2. O. S., age 35, IV para, born in Austria. Admitted to hospital on December 7, 1917, stating that she had been in labor for 44 hours; that soon after her labor pains began she sent for her family physician who washed his hands in some solution and then examined her and told her that the child was lying crossways. He then sent for another physician who examined her and they decided that she was a proper case to send into the hospital. Examination on admission showed a woman much exhausted, with a temperature of 102.8° and a pulse of 130. The pelvis was slightly justominor; cervix three fingers dilated, membranes ruptured, head not engaged, and evidently the liquor amnii had in large part drained away. Before the patient was seen by Markoe, an attempt was made to promote the engagement of the head by placing her in the obstetric chair, but as this had no effect, no further effort was made until his arrival.



Bacteriological Chart 2. December 7, 1917. Culture from vagina (Case 2, O. S.) shows streptococci (non-hæmolyzing); culture from uterus shows streptococci (non-hæmolyzing). Cultures taken through abdominal wall.

After reviewing the history of repeated examinations, and the fact that the head would not engage and the fœtal heart was plainly heard, it was decided to perform a true extraperitoneal cæsarean section. Accordingly she was rapidly prepared, the abdomen being painted with iodine. An incision was made from the symphysis to the umbilicus in the median line, down through the fascia and muscle to the preperitoneal fat. The whole peritoneum formed of the parietal and visceral layers was pulled to the right by blunt dissection, great care being taken not to open into the peritoneal cavity or to injure the bladder or ureter, and further retracted to the right side until the anterior wall of the cervix was exposed to a sufficient extent to allow the head of the child to pass. An incision 10 centimeters in length was then made into the uterus, exposing the child's head. One blade of an obstetric forceps was used as a vectis and the head easily extracted, after which the shoulders and body were delivered and the child handed to an assistant. The placenta was then manually extracted and the fundus of the uterus followed down by another assistant, to control the moderate bleeding that followed. The opening into the uterus was then sutured with interrupted chromic sutures and the bladder and peritoneum brought back to the left side and caught with a single stitch. A large rubber drain was placed down on the fascia and the skin closed in the usual manner, leaving a place for the drain at the lower angle of the wound. A dry dressing was then applied and the patient returned to the ward. Unhappily all efforts to resuscitate the baby that weighed 3100 grammes were without avail. The patient rallied fairly well from the operation but had to be catheterized and was so restless that morphine was given from time to time. Her temperature the following morning was 100.2° F., pulse 120, respirations 26, with considerable cough and some purulent expectoration. Two days later the wound was bathed in pus and as it was evident that it was infected, the drain was removed and the wound laid open. The smear from the uterus taken at time of the operation, showed streptococci, non-hæmolytic. The Carrel tubes were then inserted; two into the deep position on the left side and two into the more superficial area. The mistake was made at first in not allowing enough of the fluid every two hours to flush through the tubes but after the use of 100 centimeters, every two hours the wound started to clear up. Another mistake was made in using the tubes covered with Turkish toweling so that several

days passed before the real value from the proper use of the tubes and solution was discovered. Then the results were really wonderful and as the bacterial count became less the wound was brought together by the use of adhesive straps. About the seventh day her bladder was found to be greatly distended and although she was catheterized every six hours, a leak was found from the bladder up into the wound. Upon this discovery a premanent catheter was introduced with good results.

CASE 3. G. M., age 27, I-para, C. N., 38841. Admitted November 24, 1917. This patient had been in labor 87 hours when first seen. The membranes had ruptured and the head was only partly engaged. The fœtal heart was running between 160 and 180. The patient's temperature was 102° F. and pulse 135. She had had two severe chills 24 hours prior to operation with temperature 105° which gave evidence of some form of an intra-uterine infection. The patient was anæsthetized, the cervix dilated almost fully and forceps applied and delivery attempted. The head could not be brought through the brim so extraperitoneal hysterotomy was decided upon. This was done in the usual manner. The abdominal wall was opened, the fascia incised and the muscle separated. The bladder was retracted to one side and the peritoneal fold retracted upward. The head was extracted by forceps rather easily and a living baby secured. The placenta was removed. The uterus was sutured with interrupted No. 3 catgut. At this time a small hole in the posterior wall of the bladder was discovered and repaired. The peritoneum was closed in the usual manner, two cigarette drains were placed in the lower angle of the incision and a dry dressing applied. The patient was in considerable shock due to extensive hæmorrhage caused by the uterus filling up. Intravenous saline and other regular methods of stimulation were given to which the patient responded. She was then returned to the ward and re-acted fairly well for the first three days; then her temperature began to rise and the entire wound opened up. Ordinary methods were tried the the patient did not improve. She was placed on the Carrel-Dakin treatment which caused an immediate improvement in the superficial appearance of the wound. The tear in the bladder sloughed, forming a vesical fistula. This was kept partly under control by a self-retaining catheter placed in the bladder. Notwithstanding the serious condition, the temperature kept down until the thirteenth day when it arose to 103° F. and the patient died on the eighteenth day of general peritonitis. Postmortem examination of the wound showed very little attempt at healing in any direction except near the surface. Infant died on labor day. Cultures were taken from the uterus at the time of operation and showed colon bacilli.

This was undoubtedly one of those cases in which the infection had already penetrated the deeper tissues before operation; no treatment has as yet been devised that is of any aid in such conditions.

In the first five cases no attempt was made to disinfect the wound at the time of operation or immediately after as the Carrel method had not been tried at that time. Although thorough drainage was adopted, the wounds were slow in healing, making the convalescence hard on the patient from the frequent and somewhat painful dressings.

With the advent of the Carrel-Dakin treatment of infected wounds, it seemed possible so rapidly to sterilize these wounds, that a study of its technique was begun at the War Demonstration Hospital of the Rockefeller Institute, which is directly under the supervision of Carrel.

Weeks were spent by Markoe in visiting the wards and studying the methods and results and with the assistance of Miss Margaret Kearney, a graduate nurse of Johns Hopkins, he was able to duplicate the apparatus necessary for its application, and after this had been procured and verified, the treatment was begun.

When the rudiments were mastered and the necessary apparatus assembled, we considered it safe to apply it to such cases in the wards of the Lying-In Hospital as might present themselves. In order that the staff and the nurses might become familiar with the details, all wounds in one of the small wards were treated by this method. Gradually they became interested in the results shown by the bacteriological charts and as soon as their interest was aroused, they entered into its perfection with zeal.

Not having used any intra-uterine treatment in puerperal cases for many years, and owing to the great improvement in our mortality and morbidity in consequence, we have not, as yet, seen an appropriate case in which to use the ingenious instruments devised by Sherman, of Pittsburgh, but they are ready on our tray for immediate sterilization and application. Postpartum septic endometritis comes to us rarely in these days, and in a personal communication Sherman states that it is only in such cases that his irrigation instruments are applicable.

On the other hand, cases where midwives

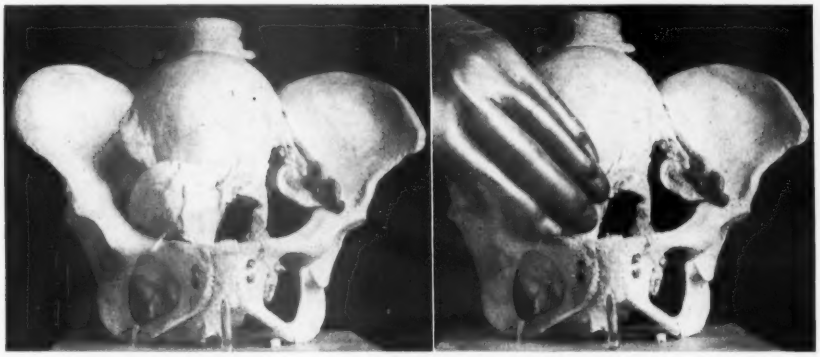


Fig. 1 (at left). Model consists of a normal bony pelvis with uterus and bladder that were removed postmortem from Case 3. This patient died of a general systemic infection.
Fig. 2. Showing method of retracting bladder in order to expose exterior wall of uterus.

or doctors have attempted to find the reason why the child is not born in the usual length of normal labor, come to us with a history of repeated vaginal examinations; even the application of forceps has been attempted in pelves through which no child could be born. But this fact has not been recognized by them, until in their unavailing efforts, they have hopelessly infected the vagina and cervix, and all too often, by the rupture of the membranes, infected the liquor amnii and endometrium as well.

These are the desperate cases that are, as a rule, not very ill at the time they are admitted to the hospital, but in whom, if a lacerating operation, such as forceps, version or even craniotomy, is attempted, penetrating, as they nearly always do, the broad ligaments, the bacteria invade the lacerations and rapidly cause a very far reaching sepsis, that all too often, proves fatal. Once the infection has penetrated the broad ligaments and involved the venous plexus and lymphatics as in McPherson's last case, any treatment will not be of much benefit.

To recapitulate then: The cases to which, in our opinion, the extraperitoneal cæsarean section combined with the immediate use of the Carrel-Dakin method is applicable are those that present the following combina-

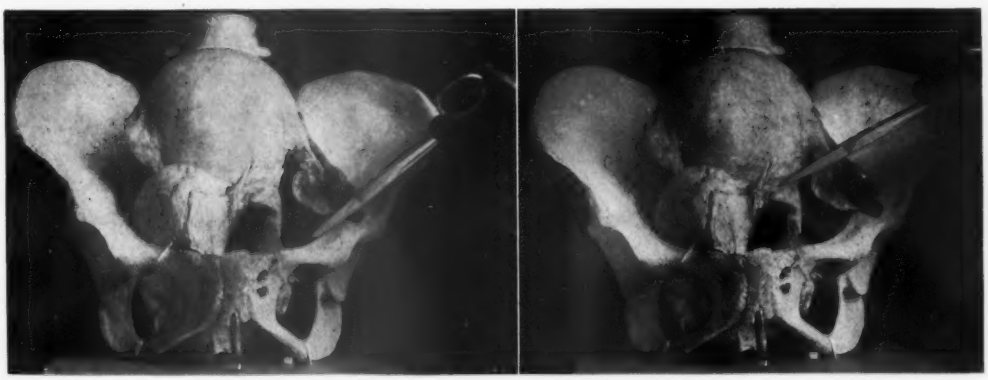


Fig. 3. Scissors point to space from which the bladder has been retracted.

Fig. 4. The opening into the uterus is entirely in the cervical portion of the uterus and extraperitoneal.

tion of conditions; a living child in a patient who is presumably infected and cannot be delivered of that living child through the normal passages.

In all such cases we believe that it is criminal to wait until the fœtal heart has ceased to beat, and then to perform a craniotomy; and furthermore even if the child is thought to be dead and a craniotomy performed, the laceration of the septic cervix is almost certain to extend into the broad ligament with consequent rapid general infection.

The classical and transperitoneal cæsarean section are, we believe, extremely dangerous and the immediate removal of the uterus with the treatment of the stump extraperitoneally, precludes the possibility of the woman ever having another child.

It seems to us that all of these objections are met by the adoption of the extraperitoneal operation, for the incision into the uterus is on the anterior wall away from the broad ligaments and is extraperitoneal, and the number of children saved by this method is equal to that of any other method. The peritoneum is not involved and unless some other complication, such as infection which has already invaded the broad ligaments, toxæmia, hæmorrhage, or extreme exhaustion from protracted labor, complicates the case, the convalescence is more rapid and accompanied with less discomfort than any transperitoneal operation. Lastly, the woman is not sterilized and if the child should not survive, she has a chance to have another, at a later date.

The objections are that it appears to be a more formidable operation than it really is, but to the surgeon who comprehends the anatomical surroundings, it is as easy as any other capital operation. The very fact of pregnancy, with its consequent loosening up of all the tissues in the pelvis, simplifies the stripping up of the unopened peritoneum from over the surface of the enlarged lower zone of the uterus. With the advent of the Carrel method of immediate and continued disinfection of the wound, the dangers should be greatly minimized. Caution must be exercised in drawing the tissues containing the bladder and unopened peritoneum to the right side, for it is easy to penetrate the peritoneum or cause a rent in the bladder. Any opening in the bladder heals rapidly, if the bladder be drained and the upper wound kept aseptic, while a small accidental opening into the peritoneum is much less dangerous than in transperitoneal operation.

That this operation is not one to be adopted by the general practitioner but only by those with hospital facilities and surgical experience, goes without saying. Under these circumstances, however, we believe it offers great possibilities for good results in the class of cases described.

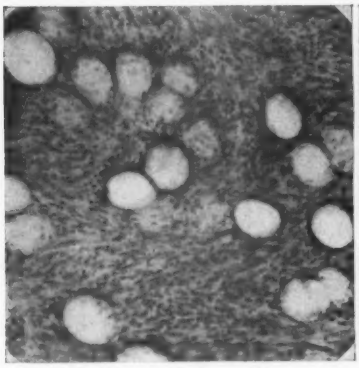
LIPOMATA IN SARCOMATOUS TRANSFORMATION

Report of Two Cases

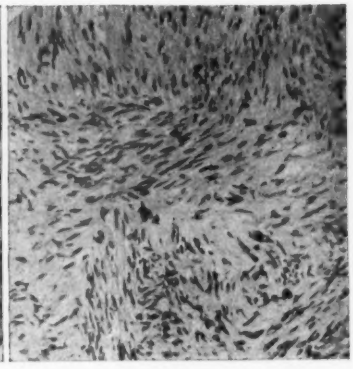
By HELIODOR SCHILLER, M.D., Chicago

LIPOMA is strictly a benign growth. Malignancy in a lipoma is of rare occurrence, but it has been observed. I recently saw two cases of lipomata with sarcomatous degeneration which I shall report briefly.

Case 1. Mrs. R., age 67, was operated on in 1006 in the Mayo Clinic of Rochester, for multiple (three) lipomata. About six years later there appeared in the middle of the scar of one of the lipomata which had been operated on, a slowly growing tumor of apparently the same nature as the previous growth. Eight weeks ago this growth began to cause pain, and, therefore, the patient saw a physician. On examination there was found just below the left mamma a linear scar of 5 inches in length, elevated by a tumor the size of an orange. The tumor presented all the clinical signs of a



Case 1.



Case 2.

lipoma, except for a hard, somewhat tender nodule in the center, the size of a plum. Extirpation was advised and done the next day. Macroscopically the specimen is a lipoma the size of an orange. In its midst is a hard, whitish yellow nodule, ovoid in shape, 3 x 4 x 4 centimeters rather sharply defined and demarcated from the surrounding fat, but having no capsule. Microscopically there is a picture of a fibrosarcoma or fibroma sarcomatosum. There are spindle cells in bundles, with little intercellular substance, few blood-vessels, there is a distinct difference in the size of the cells, large, small, broad aand narrow ones; also a difference in the nuclei.

It is singularly difficult to draw the line between a fibroma proper and fibroma sarcomatosum, between the typical and atypical connective-tissue tumors. We must take into consideration the tissue in which the tumor originates. If the tissue is rich in cells, we would call the tumor growing in it a fibroma. The tumor in question, however, originated in a lipoma, was very rich in cells, showed a pronounced difference in the size of the cells, and showed little interstitial fibrillæ, which justifies the diagnosis fibroma sarcomatosum.

Case 2. Mrs. O., age 67, had noticed for many years the presence of a tumor on the thigh, somewhat above the knee. A number of physicians had diagnosed it as a lipoma. Six weeks previously it began to be painful. The tumor was the size of an egg, with all the clinical signs of a lipoma, but containing several hard nodules. Extirpation was advised and performed the next day. The tumor was the size of an egg and had the general appearance of a lipoma. In the tumor itself were three hard nodules the size of a hazelnut, not well defined from the surrounding lipomatous tissue, rather hard in consistency and reddish gray in color. Microscopically it was a typical spindle-cell sarcoma developed on the basis of a lipoma.

In this connection, I wish to report a third case which on account of its clinical similarity, not on account of its pathological findings, well fits into this group.

Mrs. N., age 65, noticed for many years a tumor in her left axilla, which gave no evidence of its presence. She did not remember whether it had enlarged during menstruation, as she had been amenorrhœic more than 20 years. At different occasions she had showed it to physicians who called it a fatty tumor, which she, as it never grew, should leave alone. Recently the tumor has given her a great deal of pain. Clinical examination showed a very stout woman with a tumor in the subcutaneous tissue of the left axilla on the wall of the thorax. It was somewhat movable, of the size of a plum, lobulated, soft, but with a number of hard nodules in it. No glands could be felt. Extirpation was advised and done the next day. The operation showed a growth the size of a plum near the edge of the pectoralis major below the subcutaneous tissue, partly well defined from the surrounding enormously thick layer of fat, partly extending to the fascia of the brachial vessels and nerves. The whole axilla, under the pectoral muscles — the supraclavicular space — is filled with small hard lymph glands. The microscopic examination showed a typical adenocarcinoma, the tumor to my mind being an aberrant mammary gland with carcinomatous degeneration. Clinically an aberrant mamma and a lipoma can easily be mistaken, but because of the location in the axilla, the possibility of an aberrant mamma should be considered.

CURIOUS CASE OF GASTRIC ULCER CAUSED BY SHELL FRAGMENT

By L. LEYVA, M.D.
Aide-Major First Class. French Army

CORPORAL J—, wounded at Verdun, April 23, 1916, by several splinters of shell, arrived at the American Ambulance with the diagnosis of superficial wounds of the right thigh, left leg, forehead, and scalp. The wound of the thigh was the largest and involved the external muscles. Many splinters were removed and the patient was completely healed of his wounds 45 days after his arrival at the hospital. Just as he was about to be discharged, he complained of abdominal pain and said he had the sensation of a foreign body in his abdomen.

On palpation we could find no muscular resistance, but the continuous pain in the epigastric region was more severe on pressure. The patient was a big and very fat man. There was no appreciable trace of any wound, but the abdomen was striated, as is often the case in stout people. Several X-ray plates and fluoroscopic examinations were made, but nothing could be seen, so we began to think it was a case of malingering. One night the patient complained of severe pain and on examining the fæces I noted the presence of blood, the fæces being of a coffee ground color. I suspected gastric ulcer and asked Dr. Dutreix, X-ray specialist of St. Joseph Hospital, Paris, to examine the patient. He made the bismuth test and found on the posterior wall of the stomach 2 inches from the pylorus, an ulceration of a half inch in diameter. He was not able to see any foreign body, and advised operation.

On June 25, Dr. C. W. de Bouchet and myself performed a superumbilical laparotomy, following the method of Dr. Pauchet.

This method consists in opening into the lesser peritoneal cavity through the gastrocolic omentum in order to explore the posterior wall of the stomach. There were no adhesions, and exactly at the place indicated by the X-ray specialist we found an ulcer, non-perforated, and behind it a splinter very irregular and sharp pointed, about a half inch thick. This we removed very easily and with linen thread made a purse-string suture around the ulcer. Then we placed four or five catgut stitches in the omentum and proceeded to close the wound opening in the usual way.

CONCLUSIONS

Every war surgeon has found splinters in extraordinary places and, if I may say so, these splinters seem to have reached their destinations in inexplicable ways.

I am not going to try to explain in this case how the splinter of shell reached the lesser peritoneal cavity, how it managed to cause the ulcer without perforating the serous membrane, how it occasioned a hæmorrhage after 46 days, how it was sterile and how the patient was so fortunate. I only wish to call the attention of war surgeons to the possibility of a soldier having a splinter in his abdomen without any appreciable trace of a skin wound. Probably, because the wound was so very small and the patient had so many wounds, the surgeons at the front did not make note of it, especially as intestinal symptoms appeared late.

A second point no less interesting is that the X-ray plates and fluoroscopie examinations do not always show the presence of foreign bodies. In this case the splinter was concealed by the shadow of the vertebral column.

A third point is the great responsibility that rests with the war surgeon when he makes a diagnosis of malingering. In the above case had the patient been discharged he would have run all the risks of perforated gastric ulcer. A curious thing in connection with this case is the absence of any objective symptoms, apart from the pain, and later, the hæmorrhage. The patient could eat and drink anything. When he was able to get up he went out every other day and sometimes came back intoxicated. All these reasons led me to believe that it was a case of simulation.

TRANSFUSION OF BLOOD IN SEPTICÆMIA OF LONG DURATION

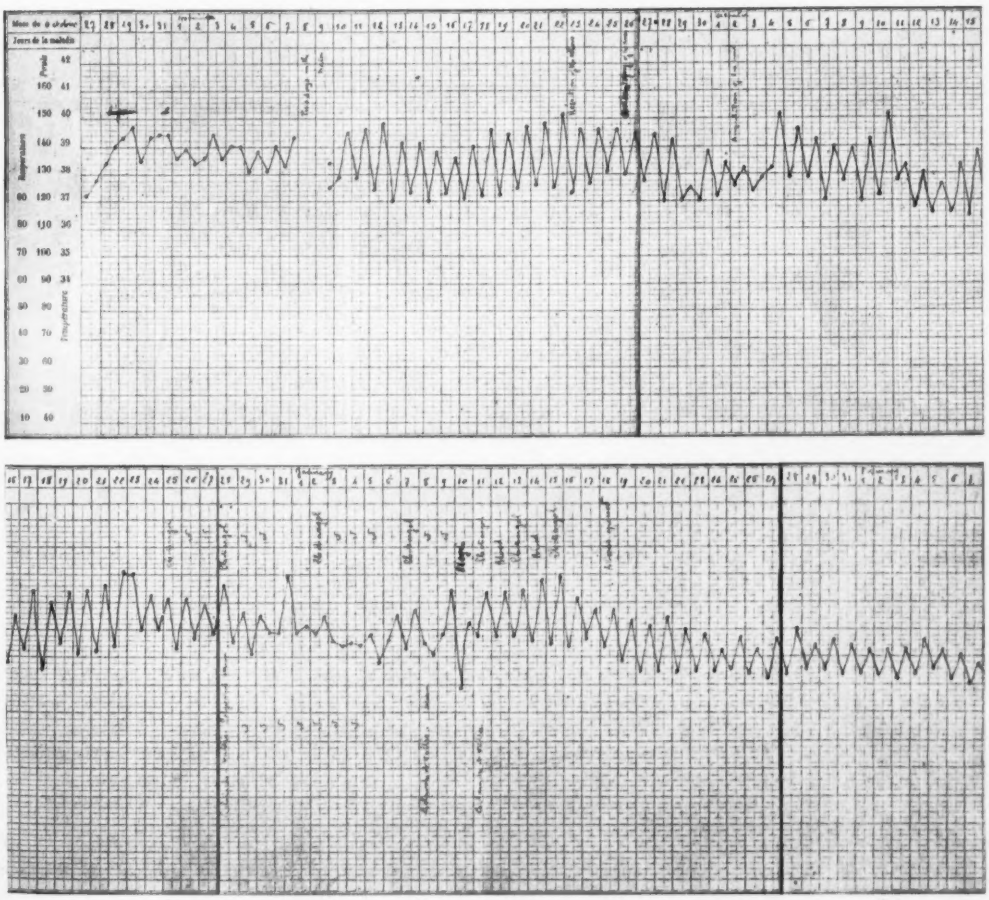
By C. MONCANY, M.D.
Ex-Interne Paris Hospitals; Aide-Major First Class, French Army

A SOLDIER wounded October 26, 1916, in the right elbow and right knee by splinters of shell, developed septic arthritis of both joints. On November 23, I operated, doing a resection of the elbow and arthrotomy of the knee-joint.

On December 2, there was a secondary hæmorrhage from the popliteal vein and as I noticed distant abscesses of the leg and also a very bad osteitis, I amputated the limb.

The pus from the wound was frequently examined and during the first fourteen days, streptococci were found. Notwithstanding that the streptococci were no longer found in the pus after that time, the general condition of the patient was very poor; the temperature was high with big oscillations and the blood culture showed the presence of the microbe.

From December 25 to February 13, I treated the septicæmia by intravenous injections of electrargol (10 cubic centimeters each) and by subcutaneous injections of Leclainche-Vallée polyvalent serum (30 cubic centimeters each). In all, eighteen injections of the former and ten of the latter were given.



The blood count showed the number of red corpuscles to be 3,220,000, and the white 6,400.

This extreme anæmia prompted me to inject human blood, which I did every second day, in doses of 100 cubic centimeters each, mixed with Locke's serum.

Three days after the last injection, a fixation abscess formed where one of the subcutaneous injections of Leclainche-Vallée serum had been given.

As soon as the abscess was opened, the temperature gradually fell to normal, and the general condition improved a good deal. The blood culture was negative and the blood count showed an increase of red and white corpuscles.

The patient made satisfactory progress.

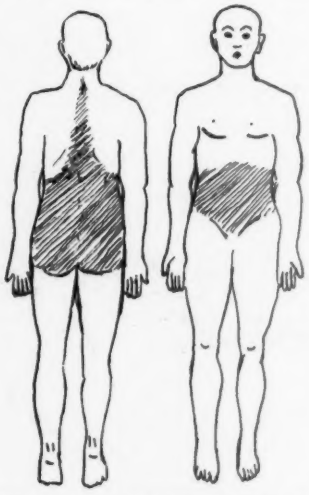
In cases of this kind, injections of human blood probably act as an hæmatopoietic stimulant.

UNUSUAL PROPAGATION OF A VASCULAR BRUIT

By C. MONCANY, M.D.
Ex-Interne Paris Hospitals; Aide-Major First Class, French Army

ON October 20, 1916, my attention was called to Sergeant H. who complained of fatigue and breathlessness after exercise of a certain duration, a sensation of giddiness, and pain at the base of the thorax which he compared to the uncomfortable feeling caused by wearing a tight belt.

This patient was sent to the hospital, September 20, 1916, to have a splinter of shell removed from the right scapula near the axilla. When examining by auscultation I found in the middle of the lumbar region a systolic bruit which might be compared to the sound of escaping steam. In seeking the method of transmission of the bruit and its limits, I was surprised to find that it was most intense in the region of the coccyx. I called the attention of Dr. Halle, Chief of the Medical Section, to this paradoxical bruit. He was skeptical at first until he had examined the patient. Following the vertebral column, the bruit could be heard from the fourth cervical vertebra to the end of the coccyx. It could also be heard in all the abdominal region, in the inguinal region, and as far as the lower part of the gluteal muscles, the bruit being more pronounced at the site of the umbilicus.



Drawing showing distribution of bruit.

The patient had been wounded nineteen months previously, on the fourth of March, 1915, by several splinters from a grenade. He was knocked down by the explosion and had a serious abdominal contusion, especially in the right side. He stayed in bed for 57 days. Later, apparently cured of his wounds, he went back to duty, on October 13, 1915. Sometimes he was in the depot and for three months at the front. He complained, often, of abdominal pain and a feeling of giddiness, but we found no indication of any wound either in the abdomen or the lumbar region.

One morning the patient was examined while fasting, and by abdominal palpation I found in the right side of the umbilicus a systolic pulsating movement, and at times a thrill. I could also see the abdominal wall pulsating. In both femoral arteries, the pulsation was the same, and there was no indication of any nervous trouble. A diagnosis of arteriovenous aneurism was established, but the cause remained unknown.

An instantaneous X-ray plate was taken and we could see a thin splinter of grenade in the front part of the right sacro-iliac joint. This splinter had not been visible on any other X-ray plate because it was mobile and too thin.

Because of the presence of the splinter and all the other symptoms we felt justified in making a diagnosis of arteriovenous aneurism of the right primitive iliac artery, the aneurism producing the systolic bruit which could be detected over a very wide surface and in unusual places.

DEPARTMENT OF TECHNIQUE

AN OPERATION FOR THE RELIEF OF PYLORIC OBSTRUCTION IN INFANTS

By RALPH C. CUPLER, M.D. F.A.C.S., Chicago
Professor of Clinical Surgery, Chicago College of Medicine and Surgery

THE stomach is emptied. Ether is administered, the usual upper right rectus muscle-splitting incision is made. The tumor is delivered and held firmly between the thumb and index finger, a longitudinal incision 2 to 3 centimeters in length is made through the serosa and circular muscle fibers down to the thickened mucosa. After the muscle is divided a definite line of cleavage between muscle and mucosa is seen. The incision is spread apart with blunt forceps. When the muscle is sufficiently liberated, the mucous membrane will protrude freely into the wound. There is very little hæmorrhage; occasionally a small vessel will require a ligature. Usually the application of a warm pad to the wound edges will control the oozing. In spreading the incision, it is best to start at the stomach end of the incision as here the merging of the stomach wall into the pyloric tumor is a gradual process and there is little danger of opening the mucosa, whereas the change from the thick and œdematous pylorus to normal duodenum is so sudden that care is necessary to avoid opening the intestine at this point.

The serosa is freed from the muscle for a distance that will allow coaptation of the edges without tension and permits the muscle to remain in the separated position. The serosa is approximated by the application of two or three coaptation sutures. This operation differs from the Rammstedt procedure only inasmuch as serosa is made to cover the mucosa. There are a sufficient number of reports of successful Rammstedt operations on record to preclude the fear of leakage and peritonitis. Still, in view of the fact that serosa can be successfully placed over the mucous membrane without materially shortening the operative time, I believe it worthy of trial; it gives one more line of defense and leaves a closed wound rather than an open one.

The abdomen should be closed in layers without drainage, the skin closed with linen, and the

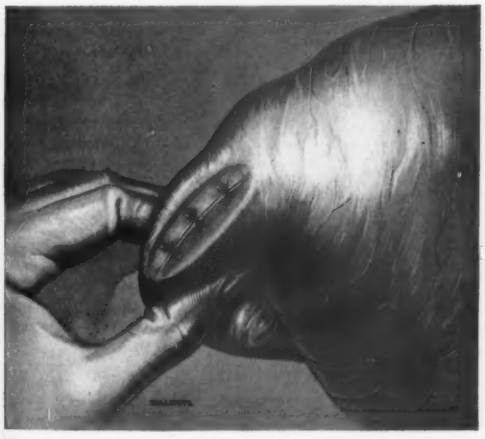


Fig. 1. Modified Rammstedt operation.

Fig. 2. Complete Rammstedt operation.

abdomen reinforced by the application of a wide circular adhesive band. Separation of the abdominal incision has occurred. This complication is not unlikely when we consider the crying and necessary handling of these patients.

The postoperative care consists of early feeding; 2 to 3 drams of diluted milk 4 to 5 hours after the operation, 1 to 3 ounces every 4 hours on the third day. Overfeeding is to be discouraged, for œdema at the operative site may occur and the symptoms return. Withdrawal of food and gastric lavage will usually correct this condition. Hypodermoclysis is frequently required.

I applied this operative precedure in an infant in May 1916, and in another in October 1917. Both had a normal postoperative recovery and have developed and progressed perfectly.

After consulting the writings of Downes I was impressed with the postmortem findings of an infant dying of endocarditis 3 months after a successful Rammstedt operation. In this case the stomach removed showed an elliptical cicatrix on the anterior surface of the pylorus about one-half the size of the original wound. The area was covered with serosa and appeared to consist of serosa and mucosa only.

Experience and time may bring out objections to the Rammstedt type of operation, but until something better is at hand, this should be the operation of election.

THE RADICAL CURE OF HÆMORRHOIDS

By CHARLES J. DRUECK, M.D., Chicago

THERE is nothing in the whole realm of surgery which affords the patient such prompt, positive, and complete relief as a well performed removal of hæmorrhoids. It is one of our most satisfactory surgical procedures.

Once the tumor has formed, subsequent inflammation will produce a hyperplasia of the connective tissue about the veins, and there is no possibility of the tumor being absorbed; it must be removed surgically. There are some cases of hæmorrhoids which had better be operated upon under a general anæsthetic when other surgical conditions need attention. However almost all hæmorrhoids may be satisfactorily operated upon under a local anæsthetic. When

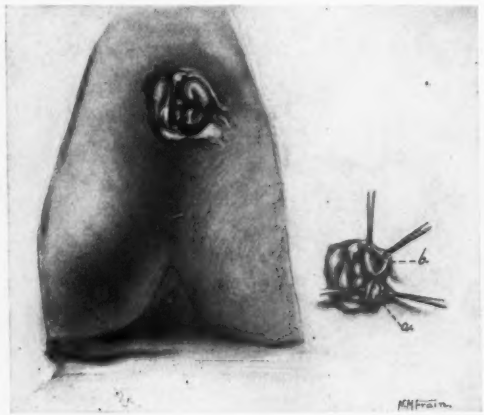


Fig. 1. *a*. Mucous membrane dissected back exposing varicosed veins. *b*. Smooth connective-tissue base after pile has been removed.

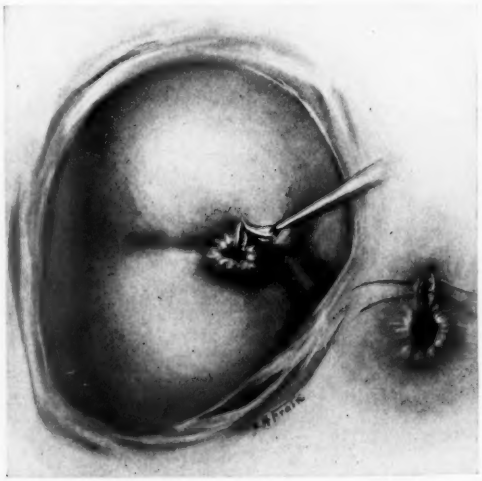


Fig. 2. Interrupted catgut sutures approximate the skin edges. Sutures must not be placed in the oval circumference so as to constrict the anal ring but simply to close the wound.

operated upon under a local anæsthetic, the patient need be away from business but a few days, and the complications endangering the life of the patient, which may follow the use of a general anæsthetic, the pain and the danger of secondary hæmorrhage due to vomiting are eliminated. A local anæsthetic has a distinct advantage in aged, timid, or nervous patients.

Preparation. The patient is as carefully and thoroughly prepared for a hæmorrhoid operation as for a laparotomy. If a cathartic is deemed necessary an ounce of castor oil is given 24 hours before the operation, to carry away septic and decomposing material from the intestine. The cathartic must be given far enough in advance of the operation to allow the patient to rid himself of it and for the peristalsis to subside. If the patient has been using a cathartic daily, the oil may sometimes be profitably omitted and thus guard against exhausting the patient. Most patients do not eat much previous to the operation, but some think it a last chance for several days and unless warned will overeat. I ask the patient to abstain from meat, vegetables with much cellulose and gas-forming foods and to subsist on broths, cooked pulpy vegetables, and other absorbable foods for the day before the operation. The patient enters the hospital the evening before the operation and if restless, is given 20 grains of bromides to insure sleep. He is given a normal salt enema that evening and then left undisturbed. Early on the morning of the operation the perianal region is shaved and cleansed and a sterile dressing applied. Three hours before the operation the patient is given a one-pint enema. One hour before the operation he is given a cup of soup, or coffee and toast, as it is better not to operate on an empty stomach. He is given a hypodermic injection containing morphine, ¼ grain, hyoscine 1/100 grain, and atropine 1/150 grain, and visitors are requested to leave him. The hypodermic quiets him, and does away with the psychic trauma.

Operation. My operative technique is the same under local or general anæsthetic. The position of the patient may be suited to the individual case. The left lateral prone position with the hips raised (the proctologic position) is satisfactory for the surgeon as well as the most comfortable for the patient and prevents the sacro-iliac strain which so often is caused by the lithotomy position. However, some patients breathe more easily in the exaggerated lithotomy position.

When the hæmorrhoid is brought well into view, it is picked up at its upper end with a hæmorrhoidal forceps and an incision beginning in the normal mucous membrane one-quarter of an inch above the hæmorrhoid is carried down on the left side of the pile, and beginning again at this upper point a similar incision is carried down on the right side of the tumor. The upper pole of the tumor is now lifted out of its base exposing the vessels as they enter the tumor from above. The vessels are grasped with a thin artery forceps and the tumor cut free. The lateral incisions are carried down to and around the lower border of the hæmorrhoid. These lateral incisions are to be kept close to the hæmorrhoid, or preferably in that part of the mucosa covering the side walls of the pile. The dissection is carried down around and beneath the hæmorrhoid to solid connective tissue or fascia about the muscle coat of the bowel and the pile is shelled out by blunt dissection (Fig. 1). This enucleation of the tumor is almost a bloodless operation. The pedicle in the grasp of the forceps at the upper end of the wound next receives our attention. The size of this pedicle will vary with the size of the hæmorrhoid, but even when the tumor is large and fleshy the pedicle is slender because it consists only of blood-vessels and the connective-tissue supporting structures between them. The pedicle is now lifted well up and examined to make sure that it is thoroughly freed from the mucous membrane and a No. 1 catgut ligature is slowly but firmly tied close down at the base. One end of the ligature now threaded on a curved non-cutting needle is passed through the base of the stump beneath the ligature. The forceps and upper part of the stump are now cut free about one-eighth of an inch above the ligature and the thread that transfixes the stump is tied over the stump and across the encircling ligature thus preventing it from slipping. As the stump is released, it retracts well into the bottom of the wound and the mucous membrane edges fall together over it. It is important to tie the stump carefully as it is small and if not properly secured secondary hæmorrhage might result. The wound edges fall together in good apposition but should be secured by two small interrupted sutures. If the tumor is in the anal canal its lower edge may rest at the white line where the skin and mucous membrane meet. If the tumor is of the interno-external variety it is to be removed *in toto* by continuing the dissection over the white line out onto the skin taking out a V-shaped piece of skin and inflammatory tissue sufficient to restore the anus to a normal appearance (Fig. 2) and the wound is closed with a

few interrupted catgut sutures. When dissecting out the hæmorrhoid, care should be taken to leave a clean-cut, smooth-surfaced wound. A ragged wound is more liable to bleed because it interferes with the normal muscular contraction of the tissues.

Whether the operation is performed under local or general anæsthetic, care should be exercised to handle the parts gently, for unnecessary dilatation of the sphincters as well as rapid or rough manipulations and catching with snap forceps the tissues which are not to be removed, all cause more subsequent pain and increase the danger of infection. It is important that skin tabs be removed at the time of the operation, otherwise they engorge and inflame and become most painful.

The operation completed and the field cleansed, the rectum and anus are well covered with sterile vaseline, carefully and freely covering each and every wound. A light gauze dressing is then applied and held with adhesive straps. I do not use a tube within the rectum because I am convinced that it does not serve any good purpose and it certainly causes the patient intense pain and is one of the active factors tending to cause retention of urine.

When the patient is put to bed he is kept in the Sim's position or else prone (on his face). Do not allow him to lie on his back because in this position the middle and superior hæmorrhoidal vessels in their upper portion are in a vertical position. At the pelvic brim they bend at a sharp angle and the abdominal contents are superimposed. All of these obstruct and as the hæmorrhoidal vessels have no valves there is a back pressure and a tendency to swelling, a giving away of the stitches and more pain as well as a delay in repair. After the first day in bed our patient may turn about and assume any comfortable position.

After-treatment. The after-treatment of hæmorrhoid patients is very exact, but unfortunately is often neglected with the result that complications frequently occur. Although general standards of postoperative care can be given there is much individuality in each case, and it is very important that the physician look after his patients himself, in so far as possible, for a little slip in the after-treatment might spoil the effect of a very good operation.

The degree of pain following any operation depends somewhat on the temperament of the patient, but also to a large degree, on the technique and skill of the operator. During the first day I use hot compresses. No opiate is needed ordinarily but there is no harm whatever in the administration of a sufficient amount of morphia hypodermically to prevent severe pain following operation. It is better to give a sufficient amount of morphia to give complete relief at once rather than to give repeated doses. For patients of average weight and strength, ¼ grain morphia and 1/100 grain atropine. In case that does not give relief the dose may be repeated in one-half to one hour.

The accumulation of flatus in the bowel is frequently an annoyance. If it occurs, urge the patient to void it. If left to himself he usually restrains the desire because he is afraid bleeding may occur and he will often spend a wakeful, restless night when he could have relieved himself without any possible harm.

Retention of urine is always a concern to the surgeon but when operating under local anæsthesia, little difficulty is experienced if the patient has been properly prepared and is not too soon disturbed after the operation. Never suggest the subject nor try to have him void his urine within the first twelve hours, postoperative. It is an effort for a healthy man to empty a partially filled bladder and if you wait twelve hours until the patient's bladder is filled he will urinate voluntarily, especially if he is allowed to slip out of bed and use a commode or urinate while standing.

The postoperative diet for the first day consists of liquids given every two hours, soup, broth, egg albumin, buttermilk and cream four ounces, with water two ounces. No milk is allowed. On the second day semi-solids, poached egg, toast, custard, rice, sago, absorbable vegetables and cooked apple, prunes or other fruit; for beverage tea, coffee, grape juice, lemonade and orangeade. After this a regulated general diet is allowed.

These patients expect defæcation to cause terrible pain and I presume their fear acts as an inhibition to evacuation. At the end of the second day I inject six ounces of mineral oil into the rectum through a soft catheter, and have the patient use a commode instead of a bed pan. Each day thereafter he is given an enema of eight ounces of normal solution or of glycerine two ounces and water six ounces. Wet cotton is used as a detergent after each bowel movement. When the patient leaves the hospital his hæmorrhoids are cured but there is still in many cases the effect of long continued disturbed digestion and the patient should be impressed with the importance of after-treatment and given direct or through his home physician

such directions regarding diet and medication as may be necessary.

I never use bichloride of mercury during the operation nor in any of the after-dressings because it sets up a teasing tenesmus as soon as the sensory nerves recover.

The advantages of this technique are:

1. The operation is thorough and may be satisfactorily performed under local or general anæsthesia. The incised wounds carefully coapted heal more readily than crushed or cauterized surfaces.

2. The sphincter muscles are not disturbed or injured by forcible dilatation as a speculum is not used.

3. The ligature is so applied as to securely hold the vessels and secondary hæmorrhage cannot occur, nor is there any sloughing tissue separating several days later.

4. The stump is small and buried, and the wound edges are closely approximated so that the resulting scar is smooth and level with the surrounding mucosa instead of being raised. Therefore, it does not obstruct the passage of the fæces. It is this raised hard scar left after operation for the removal of hæmorrhoids, which more than any other one factor tends to induce a recurrence of the trouble.

5. All of the diseased tissue is removed, therefore recurrence is impossible, but enough of the mucosa is left to maintain in good order the tactile sensibility of the anus. This is one of the points of superiority over a clamp and cautery method of operation which must necessarily grasp much tissue outside of the hæmorrhoid or else leave part of the varix behind. If a portion of the varicosed vein remains, infection and abscess is prone to occur.

6. The scar of the wound conforms to the axis of the anal canal and cannot narrow the lumen of the bowel.

7. The postoperative analgesia continues for several days and the patient is up and out in a few days.

ARTIFICIAL VAGINA UTILIZING A SINGLE PORTION OF ILEUM[1]

By A. W. ABBOTT, M.D., F.A.C.S., Minneapolis, Minnesota

INSTEAD of attempting to cover the entire subject of artificial vagina I will discuss only the advantage of using a single limb of an iliac loop in place of the entire loop; the moral side of the question will not be taken up. Suffice it to say that the psychic effect on the woman, in the writer's opinion, is often a sufficient reason for the adoption of the operation, the marriage or not of the individual being of secondary importance.

Since Baldwin, in 1904, proposed to make a mucous lining for an artificial vagina by drawing

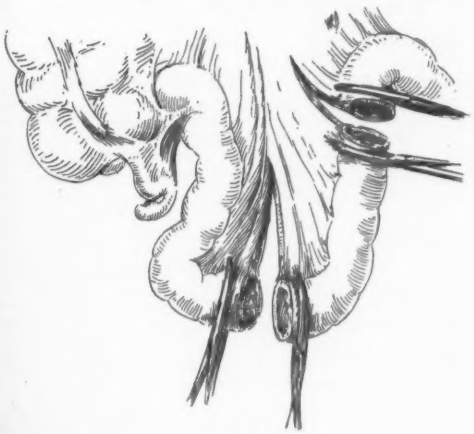


Fig. 1.

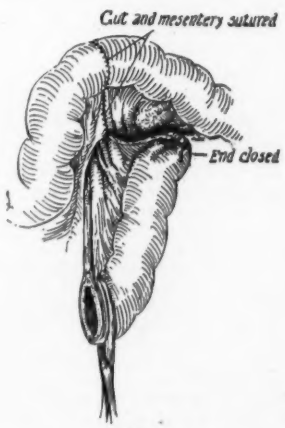


Fig. 2.

[1]Read before the Western Surgical Association, Omaha, December, 1917.

Fig. 3.

Fig. 4.

down a loop of intestine, and in 1910 reported 4 cases of his own, the operation had been done successfully in 15 cases, up to 1915. The number of cases reported and unreported to date would probably reach 30, perhaps more. In all but one, as far as known, the technique suggested by Baldwin has been followed, i.e., a loop of the ileum has been utilized and the septum is divided later when agglutination between the two limbs has become accomplished.

The one exception is a case reported by Wallace,[1] in which he made use of the sigmoid, using only one limb of the sigmoid loop.

As the ileum may be distended to the diameter of 1.5 inches without injury to its coats and as one side of the loop is just as long as the whole loop, the writer used a single limb of an iliac loop in the following case which was referred to me because the young lady had never menstruated.

Miss B., age 26, a fine specimen of young womanhood. The chest and breasts were fully and beautifully developed. She had a perfect feminine build and strongly marked feminine characteristics. There were definite menstrual molimina but there had been no vicarious menstruation. The external genitalia were fully developed with abundant hair. There was no vagina except a cul-de-sac 1 centimeter deep. Rectal examination failed to disclose any trace of a uterus or ovaries in the pelvis. In a left inguinal hernia was a body corresponding in size and shape to an ovary.

She very much wished to consummate a marriage with a young man to whom she was already promised.

In March, 1917, I operated. A vertical incision was made through the little vaginal cul-de-sac. After finding the loose connective tissue separating the vagina and rectum and following it as far as the pelvic peritoneum, the opening was enlarged laterally by stretching to 2 inches. The cavity was filled with idoform gauze. A low median incision was then made in the abdominal wall and a suitable loop of ileum selected. This, at the distal base of the loop, was in this case about 9 inches from the ileocæcal valve. Two clamps were applied at the extreme end of the loop and two at the base of the loop on the proximal side and the gut divided between the clamps at both of these points (Fig. 1). End-to-end anastomosis of proximal and distal openings with suture of mesentery, was done leaving a single leg of the gut with a clamp at each end and then, suture and inversion of the upper end, with the clamp still on the lower end (Fig. 2). The gauze, in the new vagina, being removed, a long curved forceps was carried through the vulval opening, down the new vaginal tract and forced through the peritoneum at the lower end of the new vaginal opening (Fig. 3). This opening was sufficiently enlarged, the forceps was applied to the bowel replacing the clamp controlling the lower end. The gut was now drawn through the vaginal opening to the vulva, and the abdominal wall closed. The lithotomy position was resumed, the gut sutured around the vulval opening (Fig. 4), and its lumen filled rather tightly with plain gauze. The gauze was left in the gut for 72 hours.

At the end of two weeks the patient was examined. There was a tendency to contracture at two points; first, at the vulval opening and second, where the gut passed through the peritoneum. Gradual dilatation and the use of suitable plugs readily overcame the tendency and she now has a satisfactory vagina, as shown by the X-ray obtained by using a soft rubber dam tube 1 inch in diameter filled with barium and inserted in the vagina. A larger tube, if available, could have been used. There is no excessive discharge or odor.

In making the new vaginal opening, one should be careful to seek the natural line of cleavage, the

[1] Buffalo M. J., 1911, Feb.

loose connective tissue between the vagina and rectum. This line can best be found after the vertical incision and can then be followed by blunt dissection with certainty of not piercing the bladder or rectum and with almost entire freedom from hæmorrhage. This line of cleavage in women without a vagina corresponds quite closely in direction with the direction of the vagina in normally developed women. It is perhaps slightly more horizontal. In a woman lying upon her back, the vagina, beyond the levator ani edge, is much nearer the vertical than is generally illustrated in our textbooks. For this reason a long and full curved forceps should be used in drawing down the gut into the vaginal opening.

The advantages of using one limb of the intestinal loop instead of both are:

1. It takes less of the bowel.

2. It requires the closure of only one end of the utilized limb instead of both ends of the loop.

3. A second operation to divide the septum is unnecessary. The operation is complete in one sitting.

The operation is not in itself difficult for one accustomed to abdominal surgery but requires great care and accuracy whether done by the one limb or full loop method.

So far as the writer can learn there have been no deaths from any of the Baldwin operations and the results have been functionally satisfactory.

As between the use of the ileum and sigmoid by either method, there is little to choose except that the use of the ileum is easier and by some considered safer. The use of the entire loop of intestine is certainly unnecessary.

A concise and interesting article by Novak[1] of this year and closely related to the subject of this paper discusses the history, etiology, pathology, etc., of congenital absence of the uterus and vagina.

[1]Surg., Gynec. & Obst., 1917, xxv, 532.

AN IMPROVED MURPHY DRIP APPARATUS

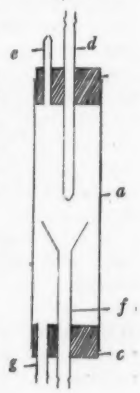
By H. DAWSON FURNISS, M.D., F.A.C.S., New York

OWING to the difficulty in administering the Murphy drip satisfactorily, I have been led to devise an apparatus in which it is necessary to observe only one factor to insure comfort to the patient, and only one more for efficiency. In spite of the fact that Murphy emphasized that the comfort of the patient depended upon the prevention of too great hydrostatic pressure and cautioned against it, nearly every one fails to carry out this idea, correctly. The apparatus, herewith described, is designed to eliminate the above mentioned fault.

The apparatus consists of a glass tube, *a*, one and one-half inches in diameter and six inches long. Both ends are closed with either a rubber stopper or a cork, *b*, and *c*. Through the upper stopper are passed two tubes, the longer, *d*, being for the inflow, and tapered at the lower end. The shorter, *e*, is an air vent to prevent siphonage when the lower tube, *g*, is filled.

The lower stopper, *c*, carries two tubes, *f* and *g*. The longer tube, *f*, is funnel-shaped at the upper end to catch the flow from tube *d*. To the lower end of tube *f* is attached the tubing leading to the rectum. The shorter tube, *g*, is for the overflow either from too fast feed or from fluid expelled from the rectum. A tube attached to this tube, *g*, leads to a basin or pail.

In use, the apparatus is so placed (either suspended by the feed tube or held by clamps connected to the bed) that the top of the funnel is only 10 to 12 inches above the rectum.



No matter how fast the inflow the hydrostatic pressure cannot exceed 12 inches — for an excess would cause an overflow at the funnel. If it were not for tube *a*, siphonage would take place when tube *g* became filled.

I am now using this apparatus on my service at the New York Post-Graduate Hospital with great satisfaction.

The first apparatus was all glass, and was abandoned in favor of the one with rubber or cork stoppers as the latter can be so much more easily cleaned.

To insure against the stoppers slipping an elastic band is placed between the tubes on the upper and the lower stoppers.

CORRESPONDENCE

REPORTING OF ACCIDENTS FROM LOCAL ANÆSTHETICS

To the Editor: The Committee on Therapeutic Research of the Council on Pharmacy and Chemistry of the American Medical Association has undertaken a study of the accidents following the clinical use of local anæsthetics, especially those following ordinary therapeutic doses. It is hoped that this study may lead to a better understanding of the cause of such accidents, and consequently to methods of avoiding them, or, at least, of treating them successfully when they occur.

It is becoming apparent that several of the local anæsthetics, if not all of those in general use, are prone to cause death or symptoms of severe poisoning in a small percentage of those cases in which the dose has been hitherto considered quite safe.

The infrequent occurrence of these accidents and their production by relatively small doses point to a peculiar hypersensitiveness on the part of those in whom the accidents occur. The data necessary for a study of these accidents are at present wholly insufficient, especially since the symptoms described in most of the cases are quite different from those commonly observed in animals even after the administration of toxic, but not fatal, doses.

Such accidents are seldom reported in detail in the medical literature, partly because physicians and dentists fear that they may be held to blame should they report them, partly, perhaps, because they have failed to appreciate the importance of the matter from the standpoint of the protection of the public.

It is evident that a broader view should prevail, and that physicians should be informed regarding the conditions under which such accidents occur in order that they may be avoided. It is also evident that the best protection against such unjust accusations, and the best means of preventing such accidents consists in the publication of careful, detailed records of the cases in which the accidents have occurred, with the attending circumstances.

These should be reported in the medical or dental journals when possible; but when, for any reason, this seems undesirable, a confidential report may be filed with Dr. R. A. Hatcher, 414 East Twenty-Sixth Street, New York City, who has been appointed by the Committee to collect this information.

If desired, such reports will be considered strictly confidential so far as the name of the patient and that of the medical attendant are concerned, and such information will be used solely as a means of studying the problem of toxicity of this class of agents, unless permission is given to use the name.

All available facts, both public and private, should be included in these reports, but the following data are especially to be desired in those cases in which more detailed reports cannot be made:

The age, sex, and general history of the patient should be given in as great detail as possible. The state of the nervous system appears to be of especial importance. The dosage employed should be stated as accurately as possible; also the concentration of the solution employed, the site of the injection (whether intramuscular, perineural or strictly subcutaneous), and whether applied to the mouth, nose, or other part of the body. The possibility of an injection having been made into a small vein during intramuscular injection or into the gums should be considered. In such cases the action begins almost at once, that is, within a few seconds.

The previous condition of the heart and respiration should be reported if possible; and, of course, the effects of the drug on the heart and respiration, as well as the duration of the symptoms, should be recorded. If antidotes are employed, their nature and dosage should be stated, together with the character and time of appearance of the effects induced by the antidotes. It is important to state whether antidotes were administered orally, or by subcutaneous, intramuscular or intravenous injection. The concentration in which such antidotes were used should also be stated.

While such detailed information, together with any other available data, is desirable, it is not

to be understood that the inability to supply such details should prevent the publication of reports of poisoning, however meager the data, so long as accuracy is observed.

The committee urges on all anæsthetists, surgeons, physicians, and dentists the making of such reports as a public duty; it asks that they read this appeal with especial attention of the character of observations desired.

TORALD SOLLMANN, *Chairman*,
R. A. HATCHER, *Special Referee*
Therapeutic Research Committee of the Council on Pharmacy and Chemistry of the American Medical Association.

PROCAINE AND NOVOCAINE IDENTICAL

To the Editor: It appears that in certain quarters the attitude is taken that the local anæsthetic sold as procaine is not identical with that marketed as novocaine. The Subcommittee on Synthetic Drugs of the National Research Council believes it important that this misunderstanding should be corrected and hence offers the following explanation:

The monohydrochloride of para-amino-benzoyl-diethyl-amino-ethanol, which was formerly made in Germany by the Farbwerke, vorm. Meister, Lucius and Bruening, Hoechst A. M., and sold under the trademarked name novocaine, is now manufactured in the United States. Under the provisions of the Trading with the Enemy Act, the Federal Trade Commission has taken over the patent that gave monopoly for the manufacture and sale of the local anæsthetic to the German corporation, and has issued licenses to American concerns for the manufacture of the product. This license makes it a condition that the product first introduced under the proprietary name "novocaine" shall be called procaine, and that it shall in every way be the same as the article formerly obtained from Germany. To insure this identity with the German novocaine, the Federal Trade Commission has submitted the product of each firm licensed to the A. M. A. Chemical Laboratory to establish its chemical identity and purity, and to the Cornell pharmacologist, Dr. R. A. Hatcher, to determine that it was not unduly toxic.

So far, the following firms have been licensed to manufacture and sell procaine:

The Abbott Laboratories, Ravenswood, Chicago; Farbwerke-Hoechst Company, New York, N. Y.; Rector Chemical Co., Inc., New York, N. Y.; Calco Chemical Company, Bound Brook, N. J.

Of these, the first three firms are offering their products for sale at this time, and have secured their admission to *New and Nonofficial Remedies* as brands of procaine which comply with the *New and Nonofficial Remedies* standards.

While all firms are required to sell their product under the official name "procaine," the Farbwerke-Hoechst Company is permitted to use the trade designation "novocaine" in addition, since it holds the right to this designation by virtue of trademark registration.

In conclusion: procaine is identical with the substance first introduced as novocaine. In the interest of rational nomenclature, the first term should be used in prescriptions and scientific contributions. If it is deemed necessary to designate the product of a particular firm, this may be done by writing procaine-Abbott, procaine-Rector, or procaine-Farbwerke or procaine (novocaine brand).

JULIUS STIEGLITZ, Chairman,
Subcommittee on Synthetic Drugs,
National Research Council.
Washington, D. C.

TRANSACTIONS OF SOCIETIES

CHICAGO GYNECOLOGICAL SOCIETY

MEETING HELD JANUARY 18, 1918, DR. N. SPROAT HEANEY, PRESIDENT, IN THE CHAIR

COINCIDENT INTRA-UTERINE AND RUPTURED TUBAL PREGNANCY

DR. ARTHUR H. CURTIS: The specimen was removed two weeks ago tonight, from a patient 33 years of age. Her previous health has been good. Two daughters were born, respectively 11 and 7 years ago. Both labors were uneventful. The younger daughter, a victim of aplastic anæmia, twice transfused by me, died three years ago. The patient's menstruation is of the 28-day type, regular, and normal in amount. The last period, which was normal, began October 30, slightly more than two months previous to operation. Associated with the amenorrhœa were the usual symptoms of pregnancy.

In the early morning, just two weeks ago, there occurred a sudden, agonizing left-sided pelvic pain, followed by extreme pallor and thready pulse. There was neither loss of consciousness nor bloody discharge from the vagina. Under morphine the condition had considerably improved when first seen by me, twelve hours later.

Examination revealed a tympanitic abdomen, containing a boggy mass rising out of the left pelvis to a level a hand's breadth above the symphysis.

At operation, immediately thereafter, there were found about two litres of free blood in the peritoneal cavity. The left tube was bleeding profusely from rupture of a pregnancy in the isthmic portion. The tube was ruptured so completely that only a small bridge of its wall remained.

The uterus, before shrunk in Kaiserling solution as you now see it, was three times its normal size and contained more than a dozen fibroids. The intra-uterine pregnancy of over two months' development, visible within the uterine cavity, was easy to diagnose at the time of operation.

Only one corpus luteum was found. This was in the right ovary, on the side opposite the tube which contained the pregnancy.

It was thought best to perform a supravaginal hysterectomy, together with removal of the left tube and ovary. The patient has almost completely recovered from the operation.

COINCIDENT CARCINOMA OF THE CERVIX AND PREGNANCY

This specimen was removed two days ago from a patient 26 years of age. She had always been well until the present trouble began. The patient began to bleed two months ago, after a history of regular, normal menstruation. Since that time daily oozing has occurred.

Examination shows an extensive squamous-celled carcinoma of the cervix, chiefly in the posterior lip. In the uterus is a fœtus approximately three months of age.

DISCUSSION

DR. CHARLES E. PADDOCK: I am not familiar with the statistics regarding the relative frequency of gestation in the tube and the uterus at the same time. I had thought that such a condition was not of such rare occurrence that Dr. Curtis should have seen but one in an extensive gynecological service. How much the uterus grows in the first few months of an ectopic gestation probably varies, but that it does increase its size up to the third month has been my opinion. If this be so I wonder then how the doctor knew that there was an intra-uterine pregnancy until he had opened the uterus. I am sure that he acted wisely in removing that organ.

DR. C. HENRY DAVIS: As I understand, the carcinoma of the cervix in this case was not of long standing.

DR. CURTIS: You must remember that the specimens on account of being in Kaiserling solution have shrunk very materially. The carcinoma of the cervix was much larger than it looks to be. It was of many months' duration, although the history dates back only three months. The growth was enormous when it was taken out, and it was fairly well defined.

DR. DAVIS: Did you leave the tubes and ovaries?

DR. CURTIS: You see the whole specimen. The ovaries were left.

DR. CHARLES B. REED: I would like to ask Dr. Curtis if he has had any experience with the effects of radium on the fœtus in such cases?

DR. CURTIS: I have not had experience with the use of radium in its effects on the fœtus. If the action of radium is selective, as I understand it is, the more highly differentiated and specialized the cells, the greater the likelihood that they will be destroyed. In view of the fact that radium has a marked action on the ovaries, I suppose there would be abortion of the fœtus due to the action on the corpus luteum if the radium be given for a considerable time.

I am very sorry Dr. Paddock did not see this case. Dr. Gibson and three or four other men were present at the time; the uterus of this woman appeared of enormous size and very soft not only to me who felt of the uterus but to those who were standing nearby. We thought there was intra-uterine pregnancy. We did not open the uterus until two or three days later.

DR. N. SPROAT HEANEY: Dr. Curtis's cases bring up two particular points which we as teachers should emphasize to our students. The first point is in regard to the size of the uterus in ectopic pregnancy. From the reading of their textbooks the students believe that the uterus is constantly enlarged in ectopic pregnancy. Most cases that come to operation come before the tenth week and it is rare for the uterus to be enlarged appreciably in the greatest number of cases that come to operation. It is only in advanced ectopic that the uterus is appreciably enlarged.

The second case shows that a very young woman may have a carcinoma of the cervix. Students gain an impression in the medical schools that there is a particular age applicable to cancer cases, called the "cancer age." This belief is so ingrained that it comes into consideration especially in differential diagnosis. A patient may have carcinoma at any age and it is distinctly bad teaching to take the age of the patient into consideration when arriving at a diagnosis.

As to the question of the frequency of extra-uterine and intra-uterine pregnancy, while I have never had a case of my own, I know from a recent examination of the literature, that they are not very common.

DR. JOSEPH L. BAER: I would like to ask Dr. Curtis whether there were any bladder symptoms in the intra-uterine and extra-uterine case, or bladder symptoms such as we find in cases of simple intra-uterine pregnancy.

With reference to the effect of radium on existing pregnancy, I know of one case of carcinoma of the vulva, a patient of Dr. Frankenthal's that was subjected to radiotherapy after a radical extirpation during pregnancy, and she miscarried at seven months.

DR. CURTIS: So far as I know, there were no bladder symptoms accompanying the pregnancy. The history we obtained was very meager; I did not go into the details as usual because the patient was very sick.

VICARIOUS MENSTRUATION

DR. EMIL RIES: About two months ago Dr. Baer reported a case of vicarious menstruation, and at that time I expressed my disbelief in the existence of such a condition. In the meantime, a case came to my knowledge which proves again the weakness of the ordinary description of vicarious menstruation. I had performed hysterectomy on a patient, and six months afterward she came to the hospital, and informed me that she had nose bleed every month. Now, when you come to nail these patients down to the exact data, you meet with disappointment. This patient could not give exact data as to periodicity or duration. However I sent her to the nose clinic. She was examined there and found to have two ulcerated areas on the septum of the nose. These were cauterized, and she has had no vicarious menstruation since.

DR. JOSEPH L. BAER: I have been awaiting an opportunity to make a final report on my case. The patient was sent to the hospital to determine definitely regarding her case as she claimed she had suffered from red sweat from the axillæ during the two years of married life. She had never menstruated. Bi-manual examination disclosed a short vagina, with no cervix, and a very rudimentary uterus, resting some 4 or 5 centimeters above the termination of the vagina. As I have said, this patient was taken to the hospital, the axillæ shaved and strapped with sterile pads of gauze and cotton and locked as securely as possible with adhesive in all directions to prevent the addition of red ink or any other subterfuge on her part. She was kept under observation. We made her exercise in order to perspire, and gave no medication. For a few days the pads showed a distinct reddish pink discoloration. These pads were sent to the laboratory, as were the original washings, and the final report of the laboratory was that there was no blood elements present either in the form of blood cells or hæmatin, as shown by the spectroscope or by any other method they had at their disposal. The pathologists suggested that it was probably a fungous growth, but they could not demonstrate the fungus either by cultural or slide methods.

DR. WILLIAM C. DANFORTH: I saw a case some seven or eight years ago in a family I was taking care of at that time. The patient was a woman a little over fifty who had vomiting of blood, with typical black tarry stools. We made a diagnosis of gastric ulcer and treated her accordingly. She wanted to have an internist see her. He saw her and made a diagnosis of vicarious menstruation from the stomach. This seemed to me to be a very farfetched diagnosis.

DR. CHARLES B. REED: The instances are somewhat hazy in my mind, but in this connection it may not be uninteresting to recall that there are definite reports of the shroud in which our Lord was enclosed when he was removed from the cross. It is supposed to be in a cathedral at Vienna, and on certain occasions it is said to turn red, and thereby apparently gives evidence of the blood which the Lord passed at the time of his crucifixion. This redness has been analyzed and found to consist of certain bacilli (bacillus prodigiosus) which simulate the appearance of blood. Arctic explorers report that the snow at times seems to be covered with blood and this too has been determined to be of bacillary or infusorial origin. It is intelligible to me therefore that Dr. Baer's case might be similar to these other instances of which we have knowledge.

INDUCTION OF LABOR AT TERM

DR. CHARLES B. REED read a paper entitled "Induction of Labor at Term." (See p. 163.)

DISCUSSION

DR. CHARLES S. BACON: It is interesting to observe the positiveness with which the author has stated his case and described his method and defended it. I wish I could be as positive about many of the procedures in obstetrics as he is about this. It would be very convincing to me if it were not for my own experience, which does not coincide with that of Dr. Reed. I have induced labor in a good many cases, but very rarely indeed to shorten the term of pregnancy, almost always for toxæmia, or where there were some other pathologic conditions; and in a few cases, but not so much in recent times, where there was a contracted pelvis. But in all of these cases I have been under the constant fear of infection, and that fear was due to the fact that I have had infection in many cases. In only two or three instances was the infection serious, but there was enough disturbance to make me feel uneasy, and I do not think that infection was due to any fault in the technique, or that it can be avoided by the adoption of any particular technique, because I do not believe that it is possible to adopt a technique that cleanses the vagina and renders it sterile. But I realize that where labor is induced by a slower method than the doctor uses, the chances of infection are greater. It has rarely happened that labor is terminated in a primipara in less than 24 hours, and frequently the labor lasts considerably longer. In multipara the duration of the labor was nearly twice as long as in the cases reported by Dr. Reed. This may account possibly for the increased infection, but the rapidity of the labor is due to the method of extraction which perhaps is rather questionable.

In normal cases 16 per cent forceps deliveries would be considered very large indeed. When in a clinic the frequency of forceps operations is 8 or 10 per cent, we generally assume it is due to the fact that the forceps were used for purposes of demonstration, and in well regulated clinics we expect not more than from 2 to 4 or 5 per cent forceps deliveries. I am inclined to think from the simple fact that forceps deliveries occur in 16 per cent of the cases that there was actually more interference of that kind than is necessary; and the use of pituitrin in a large number of cases (45 per cent) strikes me also as pretty large. Nevertheless, if those methods of hastening labor can be adopted without injury and so avoid infection they may be justifiable.

DR. C. HENRY DAVIS: Dr. Reed's work is very interesting and instructive. All of us who use bags have some little difficulties to contend with from time to time, and because of those difficulties we rather hesitate to induce labor with a bag except for particular indications.

In Dr. Reed's paper of two years ago he spoke of putting obstetrics upon the same basis as other surgical procedures, in that we could arrange the time for the patient to go to the hospital, so that we would know practically when we are going to deliver her. That would be very desirable if we could work it out, so that it would be safer for the mother and for the baby as a general proposition, but in my rather limited experience in the use of bags, I have had one patient who kept a bag for 24 hours, had pains, and failed to get any dilatation of the cervix. The bag was removed, and three days later she went into labor, and in the matter of a few hours was delivered spontaneously.

Another patient who was considered passed term, had a bag introduced, and was kept in for a considerable period of time before she expelled it, and then labor pains stopped. Pituitrin was used. One cubic centimeter of pituitrin would cause tonic contraction of the uterus, and it would be followed by one or two weaker contractions, when all pain stopped. She was given 3 cubic centimeters of pituitrin in the course of six hours without bringing her along into active labor. Finally, it was necessary to do a high forceps delivery.

Because of experiences like that, I have felt that the bag should be reserved for cases where there is a definite indication for the termination of labor. I have never tested it out in a series of cases that were apparently normal. Perhaps that is the reason Dr. Reed has had better results than the rest of us.

DR. BACON: I would like to ask Dr. Reed in closing to state in what proportion of all of his cases he uses the induction of labor.

DR. BAER: I need scarcely express my admiration of Dr. Reed's courage and enthusiasm in what he considers a pioneer field. The plausibility of it to me lies essentially in the very proper comparison that Dr. Reed makes between the overlarge child and the undersized pelvis. In other words, he has in every case relative contraction. The fallacy of the reasoning, however, to me lies in this fact that we all resort to the induction of labor in those cases that appear to us to have small pelves, or in those cases in which there seems to be an unusually large head, and yet the total number of cases in which one resorts to this operative interference is exceedingly small as compared to the total number of confinements that any one of us sees and analyzes. Therefore, I feel that in subjecting the vast majority of normal cases to the induction of labor at so-called term, in order to evade the issue of a large child, is what I consider a very tangible risk to infection. Whoever has seen sepsis arise in an apparently normal, healthy, unmolested woman in a normal confinement, and even has seen such sepsis terminate in death, must recognize that there is another factor present than merely handling of the patient or the cleanliness of the institution; that is the factor that lies within the woman herself.

DR. N. SPROAT HEANEY: Dr. Reed's paper brings up two items for consideration: one the worthiness

of induction of labor at term, and the other the relative innocuousness of the bag method of induction of labor. I think every obstetrician would agree that if labor could be induced without danger, that it would be better to have the baby come when everything is ready than to have it come later and probably be associated with great delay and injury to the mother. From time to time I have induced labor in cases where I was absolutely certain that the patient was at term, for no other reason than that the patient *was* at term, with its attendant nervous phenomena, by a method which I consider very efficient and without possibility of peculiar harm. When I have determined that the patient is due, then I have the patient come to the hospital for an internal examination. If this examination substantiates my previous examinations, I may separate the membranes from around the cervical canal and give the patient an ounce of castor oil; and when the bowels begin to move, I then give two or three doses of 3 grains of quinine at hourly intervals. This has produced labor in at least seven out of ten of all cases, including those of premature labor. In urgent cases — urgent because of high blood pressure or other signs of severe intoxication — I use the bag only when the above means have failed. In other words, I have given the bag only the hardest sort of cases to induce, and consequently my results with the bag would not naturally be so smooth as were those of Dr. Reed. Three times this year I have had a cord prolapse after the bag has been expelled from the cervix, and in two of these cases I have lost the baby. In the third, because the child was very small and the patient a multipara, I was able to deliver the child in time. In consequence, I am very alert whenever I have to resort to the bag as a means of inducing labor and have associated it in my mind with considerable possibility of danger to the child; and consequently have reserved it only for severe cases of intoxication where the child must receive secondary consideration. My experience has also been that the patient suffers ordinarily a great deal more in labor induced by a bag than when labor is more natural. I also have had bags fail to induce labor even though I can see no difference in my technique and that of Dr. Reed. I have removed bags that have been in for 24 hours where labor failed to occur, and have had the patient go into labor spontaneously 24 to 48 hours subsequently to the removal of the bag.

Dr. Charles E. Paddock: I am not convinced that the rubber bag as used by the essayist to start labor is practical in the hands of many of those who are doing obstetrical work. No doubt the essayist has developed a technique which enables him to insert the bag, where others would fail; at least, my experience has not been that of the essayist and perhaps had I attempted the use of the bag oftener I would have become more proficient. The fact that a primipara is at term does not mean that the cervix is effaced or dilated, for in how many cases do we find, at the beginning of labor, the cervix still long and the os not admitting even a finger. Does it seem logical then that often an interne, according to Dr. Reed, can introduce into the cervix, without an anæsthetic, a large Voorhees bag at 8 a.m. and have the labor terminate at 4 p.m. the same day in the majority of the cases? To me it would seem an impossibility, had not the essayist brought forth such strong proof. Why such haste? Why is it necessary to set a time for the delivery of the woman? It certainly cannot be for the convenience of the physician, because I firmly believe that such practice often complicates labor. Often there is a displacement of the presenting part and the bag frequently interferes with the mechanism of labor. Prolapse of the cord also results frequently. Therefore, if the bag be inserted, the case requires watchful care on the part of the physician, and in the majority of the cases it delays labor.

The bag has its place, but I am not ready to admit that, because I think my patient has arrived at the end of her pregnancy, a bag should be inserted to bring on labor. The essayist does not say that he uses other means of starting labor, before inserting the bag. We are familiar with the quinine and castor oil treatment. Why not try that first? In at least 50 per cent of the cases such a treatment will bring on labor pains within 24 hours. We must not forget that most of the obstetrics are not done by the specialist, and this paper when published will be read by a large class, who are always looking for something new and sensational, and coming from such a source it would be considered proper to insert a bag to bring on labor. I cannot agree with the essayist at all in this work.

Dr. Joseph L. Baer: I would like to add three points to the great advantage of the castor oil and quinine method over the use of the bag. It is the routine for induction of labor at the Michael Reese Maternity. The first point I want to make is that in order to be efficient, it should be preceded by separation of the membranes as Dr. Heaney has already explained. A single sweep of the finger inside the cervix does that. A second point is that there is a distinct difference between the susceptibility of primiparæ and multiparæ. The multiparæ respond in almost 100 per cent of the cases. The primiparæ respond in from 50 to 75 per cent. A third point is that in giving quinine we should watch the fœtal heart tones. If you give a large dose, say 10 grains once, and choose to give 10 grains again an hour later, you should check up on the heart tones, first because we have had the experience that a second dose of quinine has resulted in irregularity of the fœtal heart tones. We know that quinine exerts an influence on the musculature. The only criticism that can be offered against this method is the separation of the membranes intracervically; nevertheless, that is so innocuous as compared with the prolonged stay of the bag, that I feel it is well to emphasize the advantage of it.

Dr. Mark S. Goldstine: After listening to the remarks of Dr. Paddock, I must say in justice to

Dr. Reed that the internes on his service have introduced this bag in primiparæ without an anæsthetic, and they do it right along. I talked to his last interne about it when I saw the title of his paper, and he told me that he had introduced the bag in six cases in a three months' service, and in none did he use an anæsthetic.

With reference to the question of castor oil and quinine in starting labor, I often wonder what there is so much fuss about in starting labor. I do not believe I have given a dose of castor oil and quinine in my life for this purpose. I never saw a dose given in the Rotunda and in the last year I was there we had 4800 odd cases. I did not have many patients that went over term, and I did not worry about them if they did. I remember reading an article by Dr. J. Whitridge Williams, of Baltimore, about eight or nine years ago, in which he stated he had had one case go over term up to that time, and that was supposed to be 14 months, and the woman had a six pound baby. I do not think men who give castor oil and quinine need be so fussy when there are so few cases that go over term. I do not allow any private patient to influence me as to the time of inducing labor.

Dr. Reed (closing): I am very much gratified at the discussion that my paper has brought out. I do not think it will do any harm over the country to publish the results of any experiments we have made or any series of cases we may have promulgated for the profession to discuss. I have never found the profession so rabid that it would take things up without proper investigation or without study of the same, so I do not feel any damage will be done to their tender young minds by the process.

Dr. Baer has properly called attention to the point I was going to make in regard to separation of the membranes. That, it seems to me, is an objection. It is far more objectionable than the introduction of a bag. I do not believe that the detention of a sterile bag for three hours and twenty minutes will be as detrimental to a patient as the separation of the membranes with the finger. In fact, in clinics where the finger is carried in, as it usually is, without dilatation of the vagina by specula, it is more likely to carry flora and fauna from the vagina into the cervix than a bag which is introduced with a clean instrument and a pulled down cervix through a vagina opened by a speculum. However, I have no objections on that point if operators get no bad results.

The use of quinine and castor oil has been tried quite thoroughly at Wesley Hospital, and I think we find it works in about two out of five cases; in fact, many of our bag cases were given castor oil and quinine on the afternoon before, in the hope they would go into labor before the bag was inserted the following morning, and in some instances this happened.

Dr. Bacon wished to know in how many cases we are using the bag. In this series we have used it in about two-thirds of the cases that have come into the hospital. In the first series we used it on 100 consecutive cases.

In reference to the point Dr. Van Hoosen makes regarding the bag and scopolamine-morphine analgesia, I may say that my own practice differs considerably from hers. It seems to me, I would not use scopolamine-morphine analgesia until labor pains were well under way by use of the bag or any other means that seemed to start labor. I should be opposed to giving it before the bag was put in.

Dr. Paddock wished to know about the number of bags. I have rarely used but one bag, a No. 4 Voorhees bag. I have never used two consecutive sizes. I have sometimes introduced a second bag when either a rupture has occurred or the bag has been expelled prematurely.

In the use of the bag, I find in only five cases that chloroform was employed. I have carried out the work with multiparæ and primiparæ, and I cannot remember but two cases where it was really necessary to give any kind of anæsthetic, and I think the neurotics that come into our service are fully as numerous as may come into the service of any of the members of this society. The bag slips in easily, without any particular difficulty, and the woman complains only about the introduction of the speculum.

As Dr. Goldstine has suggested, my internes introduce the bags right along without any difficulty whatever. This brings me to another point: I have noticed that pains induced by the bag are not as a rule so powerful as the pains that come on spontaneously. But this makes no particular difference. In two or three cases, where the bag came out prematurely from rupture, the woman went on with her labor if the doctor stood over the case and took care of it. That is the secret of all bag work; the doctor or a skilled assistant must be in constant attendance and treat the case as if it were in reality surgical. He stays with it until through. This is not a hardship when the time can be chosen. In three or four cases I recall the bag came out and the women were so nervous that either my head nurse or myself stayed on those cases and massaged the uterus for an hour until the pains came on strongly, and in two instances labor terminated in two hours, and in another it was something like four hours. It is not possible to maintain sterility of the obstetrical field, as Dr. Bacon has said. It is not possible always for these cases to come through in a definite length of time. In one instance, when my head nurse was on her vacation, a woman from the ward was given to an interne for instruction purposes to put in a bag. The nurse in charge was indifferent, and the interne was careless. They put in a bag and went off and left the woman. The bag came out in two hours and a half, and about half an hour afterward the pains stopped. I came in the afternoon and found the process had been abandoned, and the woman was lying there wondering what she should do and there was nobody at hand to direct her. It was an ideal case for the bag, but it was not properly

managed. I did not insert another bag, nor did I ask that interne to take another case. The woman went into spontaneous labor two days later and she delivered in half an hour. This case would have terminated as usual if the woman had been carefully watched. One cannot achieve success in these cases unless he pays close and strict attention to them, any more than he can secure success without paying strict attention to the details of any other surgical operation.

Sixteen per cent of forceps may seem to be a large number of forceps deliveries as these cases go. There are two explanations for this, however. Our foremost idea was to make our series of cases complete in the way that we have tried to do it as a means of demonstrating that the shortening of the labor process is a means of preserving the immunity of the individual, and I believe there is less danger in the use of forceps, even to 16 per cent, than in allowing the cases to go on for eight or ten hours longer in the hope that rotation will take place and then using forceps of necessity. I believe it is only fair to the woman to do that rather than take a chance on the undiscriminating powers of nature. Furthermore, I believe that the danger of infection in these cases of prolonged labor is very great; but there is another point which Dr. Baer very properly mentioned, and that is in regard to the cases which go into spontaneous labor. We have seen them go through; we have seen them run a septic temperature and die without any interference whatever or without any examination. Now then, if we can demonstrate that so little interference as that which is produced by the introduction of the bag can be conducted without the danger of infection, then we have a point gained in regard to what constitutes infection and how much can be done without bringing on infection. It seems to me, if we can run 200 bag cases without infection, while a woman who has a normal delivery and spontaneous onset of labor has infection as she often does without examination, it certainly should not be attributed to the bag or any other means of interference in case infection should occasionally take place. Furthermore 16 per cent of forceps cases is not a high average for the service of a specialist toward which the high strung, the neurotic, the overcivilized and the anatomically imperfect naturally gravitate. A man doing general practice among strong normal women might possibly show a smaller number of forceps deliveries but the specialist necessarily gets more pathology and therefore more operative cases.

In conclusion, I think my success with the bag may be attributed to our constant watchfulness over the patients. Failures will necessarily occur by any method such as the one of the interne which I mentioned. I have never had but two failures with the bag. I have had in mind the paper of Dr. Lynch, and, it seems to me, in all of those cases where he failed, and his opinion of the bag was very radically opposed to mine, the patients were not carefully watched, and the patients were not pushed through, so to speak, as we understand the bag from our experience at present. If they had been it would have been a very different paper that Dr. Lynch would have written. My own feeling about it is that the bag is a very successful method of inducing labor, and yet I would not deny the great advantage that comes occasionally from the castor oil and quinine, nor would I deny to any one else the use of methods which appeal to him. I use this method because it appeals to me as advantageous and I believe it has a definite place in scientific procedure; but to secure the best results the process must be thoroughly understood and carefully watched.

BOOK REVIEWS

A CRITIQUE OF NEW BOOKS IN SURGERY

THE localization of foreign bodies and their extraction under the guidance of the roentgen screen are achievements of the first magnitude not only in private and hospital practice, but more particularly in the treatment of war victims. The second edition of Jaugeas' French textbook on roentgen diagnosis,[1] which has just left the press, therefore very appropriately discusses with a considerable wealth of detail the various methods now being used in the war hospitals in France to perform the necessary examinations and operations with the highest degree of rapidity and efficiency in accordance with the exigencies of the innumerable varieties of cases.

In other respects also the science of roentgenological diagnosis has experienced considerable extension and precision during the six years which have intervened between the first and second editions of this valuable publication, and the author has not failed to include the latest development of approved methods in his treatise. This required the thorough recasting of several chapters, especially those dealing with the diagnosis of affections of the alimentary tract, of the intrathoracic organs and of the urinary apparatus. The task has been accomplished in a conscientious and satisfactory manner, betraying on every page the master mind of practical experience, so that those who have not been able to follow the trend of recent improvements in detail, especially as developed at the hands of our foreign friends, will here find a trustworthy guide in the exercise of their judgment.

A similar, though not equally extensive improvement has been effected in the description of the roentgen equipment, the apparatus and instruments principally in use, and their most advantageous installation according to the immediate and general objects in view.

These points exhaust the first and second parts of the book and should be understood before its most important object, contained in the third part, can be accomplished. This deals with the diagnosis proper of all the ailments and disorders of the human body which are capable of being roentgenologically diagnosed. This part alone comprises 141 pages and is especially valuable on account of the profusion of excellent and carefully selected roentgenograms and diagrams which illustrate the text. Three principal chapters with numerous subdivisions serve to follow the anatomy of the skeleton and organs of the human body, in so far as they have proved themselves amenable to roentgenological diagnosis.

The book is thoroughly up to date and forms unquestionably the most complete textbook on the subject of roentgen diagnosis published in the French language. It is written in a terse, but simple style, so that roentgenologists who are conversant with the technical terms of their specialty will not have much difficulty in following the author throughout his fascinating description of the collective experience of the profession down to the present time.

R. D. C.

[1] PRÉCIS DE RADIODIAGNOSTIC, TECHNIQUE ET CLINIQUE, 2d ed. By F. Jaugeas, Assistant Roentgenologist to the St. Antoine Hospital and Chief of Roentgen Laboratory of Dr. Béclère, Paris. Paris: Masson & Cie, 1918.

"and still the wonder grew
That one small head could carry all he knew."

BUT the small volumes on war surgery reviewed below not merely appear to but actually do carry an enormous amount of useful information. To produce such books the authors confined themselves to the exposition of "simple facts in a plain way." Authorized by the Secretary of War and under the supervision of the Surgeon General and Council of National Defense, these books have a semi-official air which removes discussion from the realm of doubt.

MEDICAL SERVICE AT THE FRONT[2] was written for those who are not in active service, so that the authors properly begin with a brief description of army organization and throughout adhere to simple and descriptive terms in detailing the relationship between this and the Army Medical Corps. Terms and phrases used in military discussion carried through this war's literature without explanation are made clear, and by reading this book one can follow the army medical officer on all of his possible rounds, learn much of his duties, and a great deal of his relation to various other departments. This is evidently important when lines of authority are apparently as carefully drawn as in army regulations.

LESSONS FROM THE ENEMY[3] is based on a keen observation and careful collection of details relative to German medico-military organiza-

[2] MEDICAL SERVICE AT THE FRONT. By Lieutenant Colonel John McCombe, C.A.M.C., and Captain A. F. Menzies, M.C., C.A.M.C. Philadelphia and New York: Lea & Febiger, 1918.

[3] LESSONS FROM THE ENEMY; HOW GERMANY CARES FOR HER WAR DISABLED. MEDICAL WAR MANUAL NO. 5. By John R. McDill, M.D., F.A.C.S. Authorized by the Secretary of War and under the supervision of the Surgeon General and the Council of National Defense. Philadelphia and New York: Lea & Febiger, 1918.

tion. The author presents his data with very little direct comment, in the form of a very interesting narrative that should be read with interest by all medical men and many laymen. The book deals with medical military organization and reconstruction work, the actual practice of medicine and surgery being largely avoided.

WRITTEN primarily for officers of the Medical Corps, *Laboratory Methods of the United States Army*,[1] will prove itself of great value to any laboratory worker.

Formulæ, directions for preparing solutions, collecting, preserving and preparing specimens, and technical methods are given, sources of error in the execution and interpretation of tests are carefully enumerated and the methods of avoidance stated. This book in invaluable to the man interested in laboratory diagnosis.

MILITARY ORTHOPÆDIC SURGERY,[2] as its name implies, is restricted orthopedics, but only because certain civil orthopedic problems are omitted. Conditions discussed in this volume are seen frequently by all medical men as a glance at the table of contents indicates.

The first three chapters deal with the foot, normal and abnormal, and the correction of the latter. The next three deal with joint injuries and their sequelæ. Then in turn are discussed the spine and its abnormalities, nerve injuries, united and malunited fractures, bone grafting and fixation methods.

These Medical War Manuals make a very interesting and valuable series both to the military and lay physician.

IN order to meet the demands of the day, we have the new edition of Blair.[3] Its revision is such as to incorporate the latest war data concerning gunshot injuries of the face and jaws, and is compiled by the direction of Subsection on Plastic and Oral Surgery of the United States Army. Especial attention is given to injuries and infections of wounds about the mouth and jaws, and to the treatment of such wounds which require especial training along lines of prophylaxis and mechanical appliance. Reconstruction of the face — that all important topic — is treated in a most masterly fashion. New conditions, as trench mouth and the like, are given due consideration. Many chapters are completely revised, adding much to the former text and many new illustrations. The fact that this work is used as a text by the section on face surgery of the United States Army, speaks for its thoroughness and completeness. One can unhesitatingly say this work is the final word on the topic for the present.

THE success of a publication depends not alone on the facts incorporated therein, but upon the presentation of these facts in a logical and pleasing manner. In no work is this more clearly illustrated than in the new volumes edited by Binnie.[4] In reading these two volumes through, one feels as though he were at an interesting clinic, each clinician a master; the flow of language easy, the facts presented in brief and concise words. One is refreshed to find something new in the line of surgical treatises in that these volumes are not of the usual stereotype textbook variety, but a work meant for the thinking surgeon. The authors take for granted that the reader has a reading and basic knowledge of the topic, and they round out the subject and give just the information desired. It would indeed be difficult to choose the outstanding chapters in the work after reading Paul on intestinal obstruction, Mayo on the large intestine, Ochsner on appendicitis, Morison on the stomach, Fenwick on the bladder, and Lane on fractures of the lower extremities.

The surgery of the extremities in volume III is classic in that for once it is given a position in keeping with its importance. This topic is today a greater problem to the surgeon than abdominal surgery, and yet almost all authors give it a position of minor importance in their publications. The section on diseases of the upper extremities, by Lewis, is a masterpiece, and it alone should place these volumes in the hands of every surgeon.

One cannot lay these volumes aside without saying that the surgical profession has today something new, a thorough comprehensive treatise on regional surgery.

THE little volume by Moynihan[5] is a compilation of addresses delivered in Chicago during the author's recent visit, on subjects which much concern the military surgeon of today. The facts given were obtained by extensive work on the battlefields of France and Belgium by this distinguished surgeon, as well as by his observation of the work of other investigators. Of special interest is the address on gunshot wounds of the lungs and pleura. Lung surgery is taken from the misty realm of makeshift surgery and placed in the bright light of twentieth century progress.

[1] MEDICAL WAR MANUAL No. 6. LABORATORY METHODS OF THE UNITED STATES ARMY. Compiled by the Division of Infectious Diseases and Laboratories. Office of the Surgeon General, War Department. Authorized by the Secretary fo War and under the supervision of the Surgeon General and the Council of National Defense. Philadelphia and New York: Lea & Febiger, 1918.

[2] MILITARY ORTHOPÆDIC SURGERY. Prepared by the Orthopædic Council. Medical War Manual No. 4. Authorized by the Secretary of War and under the supervision of the Surgeon General and the Council of National Defense. New York and Philadelphia: Lea & Febiger, 1918.

[3] SURGERY AND DISEASES OF THE MOUTH AND JAWS. A Practical Treatise on the Surgery and Diseases of the Mouth and Allied Structures. 3d ed. revised to incorporate the latest war data concerning gunshot injuries of the face and jaws. Compiled by the section of Surgery of the Head, Subsection of Plastic and Oral Surgery, Office of the Surgeon General of the Army. By Vilray Papin Blair, A.M., M.D., F.A.C.S. St. Louis: C. V. Mosby Company, 1917.

[4] A Treatise on Regional Surgery. Vols. II and III. By various authors. Edited by John Fairbairn Binnie, A.M., C.M., F.A.C.S. Philadelphia: P. Blakiston's Son & Co., 1917.

[5] American Addresses on War Surgery. By Sir Berkeley Moynihan, M.S., F.R.C.S. Philadelphia and London: W. B. Saunders Company, 1917.

BOOKS RECEIVED

Books received are acknowledged in this department and such acknowledgement must be regarded as a sufficient return for the courtesy of the sender. Selections will be made for review in the interests of our readers and as space permits.

THE SURGICAL CLINICS OF CHICAGO. Vol. ii, Nos. 1 and 2, 1918. Philadelphia and London: W. B. Saunders Company, 1918.

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PRINCIPLES OF SURGICAL NURSING; a guide to modern surgical technic. By Frederick C. Warnshuis, M.D., F.A.C.S. Philadelphia and London: W. B. Saunders Company, 1918.

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SYPHILIS AND THE PUBLIC HEALTH. By Edward B. Veder, A.M., M.D., Lieutenant Colonel M.C., U.S.A. Philadelphia and New York: Lea & Febiger. 1918.

DÉCOUVERTE DES VAISSEAUX PROFONDS. VOIES D'ACCES LARGES. By J. Fiolle and J. Delmas. Preface by M. Pierre Duval. Paris: Masson et Cie, 1918.

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AMERICAN COLLEGE OF SURGEONS

ON HOSPITAL STANDARDIZATION

WITH POWER TO SUCCEED

THE determination of the Catholic hospitals, as expressed at the convention of the Catholic Hospital Association, Chicago, June 18–20, to meet the hospital standardization plan of the American College of Surgeons marks one of the most significant steps forward in the practice of medicine which has ever occurred on this continent. The Catholic hospitals are "one solid organization." There are 639 Catholic hospitals in the United States and Canada and when these institutions definitely take a leadership for all that makes for modern hospital efficiency their influence cannot be estimated. The following are some of the resolutions of purpose which were unanimously passed at the last convention of the Association:

1. *Be it resolved:* That we, the Catholic Hospital Association of the United States and Canada, now assembled at Chicago in our third annual convention, approve of the work being done by the American College of Surgeons for the standardization of hospitals, and assure the College of our fullest co-operation in its endeavor for the betterment of hospitals and the resultant increased welfare of mankind.

2. *Be it resolved:* That we, the members of the Catholic Hospital Association, now assembled in Chicago, do hereby declare our desire to adopt a washable uniform or gown, along with a curtailed veil, to be worn when in actual service of the sick, in so far as it will meet with the approval of our superiors and be in keeping with the spirit and traditions of our respective orders or congregation and meet with sanction of ecclesiastical authorities.

3. *Be it resolved:* That we, the members of the Catholic Hospital Association call upon all of our members who are sisters to become, as far as practicable, registered nurses; and to establish training schools for nurses wherever and whenever practicable.

To the various state boards of our respective states and provinces, we pledge our determined efforts to co-operate in maintaining the highest reasonable standards in our training schools for nurses and in all other health service that comes under their jurisdiction, and within the sphere of our activities.

4. *Be it resolved:* That we, the members of the Catholic Hospital Association, pledge ourselves to organize controlled staffs in our hospitals; to establish or continue an adequate system of case records, with a sister in charge, having full authority to demand the careful co-operation of doctors, internes, and nurses; and to require of our staffs a monthly or bi-monthly analysis of these records; to secure from our superiors, staffs, or friends funds properly to equip all necessary laboratories and to bring about as soon as possible the scientific training of our sisters and technicians of all kinds, anæsthetists, dieticians, record-keepers and social service experts.

We further pledge ourselves to urge all surgeons who are privileged to practice in the hospitals of the Association, and who are not at this time Fellows in the American College of Surgeons, to qualify, as soon as they are able, for fellowship in the College.

We further wish to express our desire that all doctors who practice in our hospitals be or become, as soon as practicable, members in good standing of their respective county medical societies and contribute their share to the active medical life of said societies.

We further wish to express our conviction that the secret division of fees, as condemned by the American College of Surgeons, is an unethical and nefarious practice which we pledge ourselves to keep out or root out of our hospitals.

DRIVES STRAIGHT FOR RESULTS

HUNDREDS of hospitals in the last few months have taken action with regard to the hospital standardization plan of the American College of Surgeons. An instance of straight thinking among these institutions, which will interest all hospitals and doctors, comes from the Ellis Hospital, Schenectady, New York. After writing a resolution against the division of

fees into the by-laws, the hospital has put the following resolutions into effect:

1. After July 1, 1918, the Ellis Hospital shall keep in a systematic manner case records of all patients treated in the hospital together with a convenient summary of each case; and these records shall be utilized in analyses to ascertain the efficiency of the medical and surgical work done in the hospital.

2. These records shall contain the following data for each patient treated: identification of the patient by name or number; name of physician or surgeon responsible for the case; personal history of patient relevant to complaint; diagnosis on which treatment was based; laboratory and physical findings; important points of operation or of treatment; postoperative diagnosis; complications of convalescence; follow-up records; autopsy findings.

3. It shall be the duty of the historian to record the necessary data on forms prescribed by the History Committee of the staff.

4. The data may be obtained by the attending physician or surgeon, or by an interne or by the historian, but the historian shall be held personally responsible for a history of every case. Refusal or neglect on the part of the attending man to give the necessary aid to the historian in procuring the data, will result in the withdrawal of his privilege of treating cases in the hospital.

5. It shall also be the duty of the historian to make out a summary card for each patient together with a follow-up record as prescribed by the Hospital Standardization Committee of the American College of Surgeons. And it shall be her duty to make such statistical compilations of the results obtained as may be required by the American College of Surgeons or by the staff of the hospital.

6. Medical histories must be taken and physical examinations made not later than the first twenty-four (24) hours the patient is in the hospital.

7. In surgical cases the essential history pertaining to the conditions for which the patient is to be operated upon, together with the record of the physical examination, must be furnished to the hospital before the patient is operated upon, except that in emergency cases this history may be dictated by the surgeon before or during the operation. In non-emergency operation cases the history and record of the physical examination shall be delivered to the hospital by the surgeon or ample time shall be allowed for taking the history, of surgical patients after the patient reaches the hospital.

8. In all surgical cases the surgeon shall, previous to the operation, record the diagnosis on which his treatment is based. This diagnosis shall be posted on the board where operations are listed.

9. During, or at the close of each operation, a description of the pathological findings and the operation must be recorded together with a diagnosis based on the gross pathology. This shall be dictated by the surgeon himself.

GATES OF ADMISSION TO FELLOWSHIP

THE Regents and Fellows of the American College of Surgeons must read with interest the recent correspondence in *The Lancet* (London) between Sir William Osler and Sir George Henry Makins, President of the Royal College of Surgeons of England. Eighty-two per cent of the candidates who recently met the primary examination for the fellowship of the Royal College, it seems, were rejected. Commenting upon the formal examinations of the Royal College of Surgeons as a test for Fellowship in the College, Sir William, in part, writes:[1]

"Must we wait for a total rejection (of candidates) before the College realizes the rottenness of the present system? System it must be, dear Makins; for are not the teachers who fail so ingloriously among the best of your Fellows (in anatomy at any rate); are not the examiners, who are so successful, picked men of the same class; and the unhappy victims — well, it seems ridiculous to say so — but are they not our very best students?

"In your skill and judgment the profession has unusual confidence. Induce the College to relieve an intolerable situation. Abolish a system which is a reproach alike to teachers and examiners, and worst of all a cruel perversion of mental values to the student at the very time of life when such values count."

Sir William then makes two recommendations, which are of especial interest in their bearing upon the requirements for admission to fellowship in the American College of Surgeons, as follows:

"1. Make the candidates spend the time (now wasted in cramming) in the laboratories and hospitals.

"2. Let them come to the examiners' board

[1]The Lancet, Lond., 1918, May 18, 715.

with proofs of personal study and research in anatomy or physiology for the Primary — and, may I add, in pathology or surgery for the Final."

In reply to Sir William's letter, Sir George says with regard to the experience of the results of the primary examination for the fellowship of the Royal College:[1]

"No element, in my opinion, has done so much to induce the candidate for the Fellowship of the College from a well-informed surgeon to the level of a 'carefully prepared' individual, and any change which could result in the substitution of personal observation and research for careful class preparation would indeed be a step in a happy direction."

From the outset the Regents of the American College of Surgeons have been convinced that a formal examination, which covers the subjects of the medical curriculum, would not prove to be the wisest test for Fellowship in the American College of Surgeons. The tests which the Regents devised, now in operation for the last three years, have proved to be reasonable and effective. They fulfil to a large degree Sir William's recommendations. Before the candidate for fellowship in the American College may be "approved for examination" he is asked to submit evidence, in addition to graduation in medicine, of special training in the specialty of surgery as follows:

"The candidate shall give evidence that he has served at least one year as an interne in a creditable hospital and two years as a surgical assistant, or he shall give evidence of an apprenticeship of equivalent value. Five to eight years after graduation in medicine, devoted to special training and to practice, are normally the time-requirement for eligibility to fellowship. Due importance is attached to laboratory and research work.

"The ethical fitness and integrity of the candidate and his professional attainment shall be passed upon by the Credentials Committee of his state or province before he is entitled to take the examinations for admission to fellowship."

As further evidence, then, of the candidate's fitness for fellowship in the College the following requirements are made:

"The examination in the art and technique of surgery consists of, first, fifty complete case records to be submitted by the candidate of major work performed by himself; second, fifty case records in brief abstract of major work for which he was responsible or in which he acted as assistant."

In the first year of the administration of the present requirements for admission to fellowship in the American College of Surgeons, 66 per cent of the candidates who submitted case records were unsuccessful. In the second year approximately 55 per cent of the candidates were unsuccessful. Reasons for these failures are stated to be: first, that the candidates failed to record adequate physical examinations of their patients; second, that they did not give evidence of having sufficiently studied their cases or of availing themselves of the various laboratory tests which might aid in correct diagnoses; and, third, that in many instances, even where the physical examinations and the laboratory tests were carefully set down, the surgical judgment as indicated by the procedure of the candidates was such as not to warrant favorable action.

There is a large human factor in any adequate test such as the American College of Surgeons maintains for admission to its fellowship. This human factor is frequently stated at the meetings of the Credentials Committees of the College and at the meetings of the Committee on Examinations in this way: Would you, on the evidence submitted with regard to the candidate, be willing to refer your patient to this candidate for diagnosis and operation?

[1] The Lancet, Lond., 1918, May 25, 748.

Clinical Congress
American College of Surgeons

NINTH ANNUAL MEETING
NEW YORK CITY
OCTOBER 21 TO 26, 1918

COMMITTEE ON ARRANGEMENTS

J. Bentley Squier, Chairman

New York City

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Clarence G. Bandler
S. W. Bandler
John A. Bodine
LeRoy Broun
Leo Buerger
W. E. Caldwell
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Charles H. Chetwood
James B. Clemens
Cornelius G. Coakley
Martin Cohen
William B. Coley
Royal S. Copeland
Edwin B. Cragin
Asa B. Davis
John Douglas
Charles N. Dowd
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Harry M. Imboden
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Robert Lewis
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Alfred S. Taylor
Howard C. Taylor
Antoine P. Voislawsky
Charlton Wallace
George Gray Ward, Jr.
Wilbur Ward
John E. Weeks
Frederick Whiting
Royal Whitman
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W. F. Campbell
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G. L. Deely
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Russell S. Fowler
F. C. Holden
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William Linder
S. H. Lutz
Joseph P. Murphy
John Osborn Polak
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Raymond P. Sullivan
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J. S. Waterman
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CLINICAL CONGRESS OF AMERICAN COLLEGE OF SURGEONS

WILLIAM J. MAYO, M.D., President. ALBERT J. OCHSNER, M.D., Treasurer.
FRANKLIN H. MARTIN, M.D., Secretary-General.

PLANS FOR THE NEW YORK MEETING

ON the following pages is presented a preliminary schedule of clinics and demonstrations to be given during the ninth annual session of the Clinical Congress to be held in New York City the week of October 21st. The schedule is necessarily incomplete at this time and will be amplified and corrected from month to month as the work of the Committee on Arrangements progresses, the final program to represent fully the clinical work of the surgeons of New York City and Brooklyn in all departments of surgery, including gynecology, obstetrics, urology, orthopedics, surgery of the eye, ear, nose and throat, roentgenology, experimental surgery, surgical pathology, etc.

War surgery will be the one general topic for discussion at the evening meetings in the ballroom of the Waldorf-Astoria. Papers presented by distinguished medical officers of the English, French, and Italian armies, and by eminent American surgeons will summarize the notable surgical achievements of the past four years, including the newest methods in the treatment of fractures, infections, injuries of the brain and nerves, surgery of the chest, surgery in the reconstruction of disabled soldiers and sailors.

Headquarters will be established at the Waldorf-Astoria and McAlpin hotels. The ballroom, Astor Gallery, Myrtle and East rooms, together with other large public rooms and foyers on the second floor of the Waldorf-Astoria, have been reserved for the use of the Congress for its registration and ticket bureaus, bulletin rooms, etc. The ballroom will be used for the large general sessions, afternoons and evenings, cinematographic exhibitions, etc. Because of its large number of guest rooms, the Hotel McAlpin, under the same management as the Waldorf-Astoria, and located in the same block, will be able to take care of a very large number of visiting surgeons.

The popularity of these clinical meetings has proven so great that it has been found necessary to limit the attendance, thereby requiring advance registration. This plan has proven satisfactory at previous sessions of the Congress and will be enforced at the New York meeting, thereby assuring accommodations at the clinics for each one who receives a membership card. A survey of the operating amphitheaters, lecture rooms, and laboratories in the hospitals and medical schools as to their capacity for accommodating visiting surgeons will be made and the limit of attendance will be based thereon.

Attendance at all clinics and demonstrations will be controlled by means of special tickets, the number of tickets issued for any clinic or demonstration being limited to the capacity of the room in which the clinic or demonstration is to be given. The general rule will be that a member may have two tickets for each day, one for a morning and one for an afternoon clinic. For certain clinics where the accommodations are limited and the demand for tickets is heavy, it may be necessary to establish a rule whereby a member may have only one ticket for such clinic during the week.

The use of special tickets has proven an efficient means of providing for the distribution of members among the several clinics and ensures against overcrowding at any clinic. Special tickets will be issued each morning for the clinics and demonstrations to be held that day, a complete schedule of the day's clinics having been posted on the bulletin board on the afternoon of the preceding day, and a printed program distributed in the morning.

A registration fee is required of each member attending an annual meeting, the receipts from registration fees providing the funds with which to meet the expenses of such meetings, so that no financial burden is imposed upon profession in the city entertaining the Congress.

PRELIMINARY CLINICAL PROGRAM

GYNECOLOGY

Monday

HIRAM N. VINEBERG — Mount Sinai Hospital — 2.
JOSEPH BRETTAUER — Mount Sinai Hospital — 1:30.
FRANK R. OASTLER and EDWARD T. HULL — Lincoln Hospital — 3.
LEROY BROUN — Woman's Hospital — 2.
DOUGAL BISSELL — Woman's Hospital — 8:30.

Tuesday

EDWIN B. CRAGIN — Sloane Hospital — 3.
FRANK R. OASTLER — Lenox Hill Hospital — 9:30.
G. SEELIGMANN — Lenox Hill Hospital — 9.
HOWARD C. TAYLOR — Roosevelt Hospital — 9.
G. G. WARD, JR.— Woman's Hospital — 2.
HERMANN GRAD — Woman's Hospital — 8:30.
C. G. CHILD — Polyclinic Hospital — 9.
WILLIAM P. HEALY — Fordham Hospital — 9.
A. STEIN — Lenox Hospital — 2.
S. W. BANDLER — Post Graduate Hospital — 9.
G. SEELIGMAN — Lebanon Hospital — 9.

Wednesday

H. DAWSON FURNISS — Post Graduate Hospital — 9.
I. S. HAYNES — Harlem Hospital — 2.
DOUGAL BISSELL — Woman's Hospital — 2.
WILLIAM P. HEALY — Roosevelt Hospital — 9.
A. STEIN — Harlem Hospital — 2.

Thursday

HIRAM N. VINEBERG — Mount Sinai Hospital — 2.
JOSEPH BRETTAUER — Mount Sinai Hospital — 1:30.
HOWARD C. TAYLOR — Roosevelt Hospital — 2:30.
I. S. HAYNES — Park Hospital — 2.
LEROY BROUN — Woman's Hospital — 2.
C. G. CHILD — Polyclinic Hospital — 9.
M. ROBINSON — Beth Israel Hospital — 2.
S. W. BANDLER — Beth Israel Hospital — 2.
G. SEELIGMANN — Lebanon Hospital — 2.

Friday

FRANK R. OASTLER — Lenox Hill Hospital — 2:30.
G. SEELIGMANN — Lenox Hill Hospital — 2.
G. G. WARD, JR.— Woman's Hospital — 2.
HERMANN GRAD — Woman's Hospital — 8:30.
S. W. BANDLER — Post Graduate Hospital — 9.

Days and hours to be announced

J. C. TAYLOR — Polyclinic Hospital.
T. H. MORGAN — Polyclinic Hospital.
L. J. LADINSKI — Polyclinic Hospital.
WILLIAM E. STUDDIFORD — Bellevue Hospital.
J. N. WEST — Post Graduate Hospital.
M. CATURANI — Italian Hospital.
H. S. STEARNS — City Hospital.
WALTER G. CRUMP — Hahnemann Hospital, New York Medical College for Women, Broad Street Hospital.

UROLOGY

Monday

DRS. BUERGER, HYMAN and ASCHNER — Mt. Sinai Hospital — 1:30. Operations on kidney, ureter, bladder, and prostate. Demonstration of cases.
G. W. SWINBURNE and Assistants — Good Samaritan Hospital Dispensary — 10. Out-patient clinic.
DRS. ACKERMAN, ZAHLER, PANOF and FRIEDMAN — St. Mark's Hospital — 9. Out-patient clinic.
VICTOR C. PEDERSEN — St. Mark's Hospital — 11. Operations and demonstrations.
JOSEPH J. ASCH — Lenox Hill Hospital — 2. Demonstrations in general urology and cystoscopy.
FREDERIC BIERHOFF and L. L. MICHEL — West Side German Dispensary.
H. S. JACKS — Bellevue Hospital. Demonstration of pathological material and methods in urology.
B. S. BARRINGER — Bellevue Hospital — 2. Kidney and prostate operations.

Tuesday

DRS. BUERGER, HYMAN, and ASCHNER — Mt. Sinai Hospital — 9. Operative cystoscopy. New method of treating filiform stricture of urethra through the universal urethroscope. Method of dilating ureter for descending ureteral calculi. Snaring of papillomata. Cystoscopic and urethroscopic diagnosis. Pathology of urological lesions and contraction of the neck of the bladder.
MAX HUEHNER — Mt. Sinai Hospital — 9. Demonstrations in diagnosis and care of sexual neurasthenia, pollutions, etc.; care of bladder tumors.
M. W. WARE — Mt. Sinai Hospital — 2. Operative clinic.
G. W. SWINBURNE and Assistants — Good Samaritan Hospital Dispensary — 10. Out-patient clinic.
DRS. ACKERMAN, ZAHLER, PANOF, and FRIEDMAN — St. Mark's Hospital — 9. Out-patient clinic.
F. ACKERMAN — St. Mark's Hospital — 11. Operative clinic.
H. G. BUGBEE and F. E. DUBOIS — Woman's Hospital — 10. Operations and demonstrations.
DRS. AYRES and CARLETON — Flower Hospital — 3. Bladder cases; operations and demonstrations.
OSWALD S. LOWSLEY — Bellevue Hospital — 2. Operations and demonstrations.
DRS. FURNISS, BULLARD, and PERILLI — Post Graduate Hospital — 2. Cystoscopic clinic.
MAXIMILIAN STERN — Broad Street Hospital — 2. Demonstrations of vesical neck obstructions and urethral strictures with new operating urethroscope.. Hyperæmia treatment of urethral stricture. Operative clinic.

Wednesday

DRS. BUERGER, HYMAN, and ASCHNER — Mt. Sinai Hospital — 9. Operative cystoscopy. New method of treating filiform stricture of urethra through the universal urethroscope. Method of dilating ureter

for descending ureteral calculi. Snaring of papillomata Cystoscopic and urethroscopic diagnosis. Pathology of urological lesions and contraction of the neck of the bladder.

LEO BUERGER — Polyclinic Hospital — 3:30. Operations on kidney and ureter.

G. W. SWINBURNE and Assistants — Good Samaritan Hospital Dispensary — 10. Out-patient clinic.

DRS. ACKERMAN, ZAHLER, PANOF, and FRIEDMAN — St. Mark's Hospital — 9. Out-patient clinic.

VICTOR C. PEDERSEN — St. Mark's Hospital — 11. Operations and demonstrations.

JOSEPH J. ASCH — Lenox Hill Hospital — 2. Demonstrations in general urology and cystoscopy.

H. G. BUGBEE and F. E. DUBOIS — St. Luke's Hospital — 10. Operations and demonstrations.

DRS. CARLETON and HALFMAN — Metropolitan Hospital — 3. Operative clinic.

FREDERIC BIERHOFF and L. L. MICHEL — West Side German Dispensary.

OSWALD S. LOWSLEY — New York Hospital — 10. Surgery and surgical pathology of the human prostate gland and seminal vesicles, demonstrated by lantern slides. Renal and ureteral lithiasis, demonstrated by specimens and lantern slides.

CHARLES J. GOELLER — New York Hospital — 10. Acute epididymitis; its treatment, surgical and non-surgical.

MAX S. ROLIDE — New York Hospital — 10. Gonorrheal infection of the kidney; demonstration of two proved cases.

FRANK DEALEY — New York Hospital — 10. Pathological conditions of the bladder shown by cystoscopy.

B. S. BARRINGER — Memorial Hospital — 2. Radium treatment of carcinoma of bladder and prostate.

H. DAWSON FURNISS — Post Graduate Hospital — 9. Operative clinic (women).

EUGENE FULLER — City Hospital — 2. Operative clinic.

Thursday

DRS. BUERGER, HYMAN, and ASCHNER — Mt. Sinai Hospital — 1:30. Operations on kidney, bladder and prostate. Demonstration of cases.

MAX HUEHNER — Mt. Sinai Hospital — 9. Demonstrations in diagnosis and care of sexual neurasthenia, pollutions, etc.; care of bladder tumors.

G. W. SWINBURNE and Assistants — Good Samaritan Hospital Dispensary — 10. Out-patient clinic.

DRS. ACKERMAN, ZAHLER, PANOF, and FRIEDMAN — St. Mark's Hospital — 9. Out-patient clinic.

H. G. BUGBEE and F. E. DUBOIS — Woman's Hospital — 10. Operations and demonstrations.

OSWALD S. LOWSLEY — Bellevue Hospital — 2. Lesions of the external genitalia; exhibition of patients and lantern slide demonstrations. Malignant growths of urological organs, demonstration of post-operative patients.

MAXIMILIAN STERN — Broad Street Hospital — 2. Demonstrations of vesical neck obstructions and urethral strictures with new operating urethroscope. Hyperæmia treatment of urethral stricture. Operative clinic.

DRS. FURNISS, BULLARD and PERILLI — Post Graduate Hospital — 9. Cystoscopic clinic.

Friday

G. W. SWINBURNE and Assistants — Good Samaritan Hospital Dispensary — 10. Out-patient clinic.

DRS. ACKERMAN, ZAHLER, PANOF, and FRIEDMAN — St. Mark's Hospital — 9. Out-patient clinic.

F. ACKERMAN — St. Mark's Hospital — 11. Operative clinic.

VICTOR C. PEDERSEN — St. Mark's Hospital — 11. Operations and demonstrations.

JOSEPH J. ASCH — Lenox Hill Hospital — 2. Demonstrations in general urology and cystoscopy.

H. G. BUGBEE and F. E. DUBOIS — St. Luke's Hospital — 10. Operations and demonstrations.

FREDERIC BIERHOFF and L. L. MICHEL — West Side German Dispensary.

M. W. WARE — Mt. Sinai Hospital — 9. General clinic.

OSWALD S. LOWSLEY — Bellevue Hospital — 2. Operations and demonstrations.

Days and hours to be announced

A. L. WOLBARST — Beth Israel Hospital — Vasopuncture. Litholapaxy. Catheterization of ejaculatory canals. Epididymo-vasostomy (Martin). Cystoscopic and urethroscopic demonstrations.

EUGENE FULLER — Post Graduate Hospital — Seminal vesiculotomy.

ORTHOPEDIC SURGERY

Monday

New York Orthopedic Hospital — 9, operations; 1:30, out-patient clinic.

Clinic for Functional Re-Education of Disabled Soldiers and Sailors — 10 to 4, out-patient clinic.

Hospital for Ruptured and Crippled — 1, operations; 1 to 3, out-patient clinic.

Bellevue Hospital — 3, out-patient clinic.

Post Graduate Hospital — 4:30, operations.

Hospital for Deformities and Joint Diseases — 2 to 3, out-patient clinic.

Tuesday

Hospital for Deformities and Joint Diseases — 8:30, operations; 2 to 3, out-patient clinic.

Hospital for Ruptured and Crippled — 9, operations; 1 to 3, out-patient clinic.

New York Orthopedic Hospital — 9, operations; 1:30, out-patient clinic.

Post Graduate Hospital — 9 and 4:30, operations.

Clinic for Functional Re-Education of Disabled Soldiers and Sailors — 10 to 4, out-patient clinic.

Bellevue Hospital — 2, out-patient clinic; 3, operations.

St. Luke's Hospital — 3:30, operations.

Wednesday

Hospital for Ruptured and Crippled — 9, operations; 1 to 3, out-patient clinic.

New York Orthopedic Hospital — 9, operations; 1:30, out-patient clinic.

Clinic for Functional Re-Education of Disabled Soldiers and Sailors — 10 to 4, out-patient clinic.

Hospital for Deformities and Joint Diseases — 2 to 3, out-patient clinic.

Bellevue Hospital — 3, out-patient clinic

Post Graduate Hospital — 4:30, operations.

Thursday

New York Orthopedic Hospital — 9, operations; 1:30, out-patient clinic.
Hospital for Ruptured and Crippled — 9, operations; 1 to 3, out-patient clinic.
Hospital for Deformities and Joint Diseases — 8:30, operations; 2 to 3, out-patient clinic.
Bellevue Hospital — 2, out-patient clinic; 3, operations.
Clinic for Functional Re-Education of Disabled Soldiers and Sailors — 10 to 4, out-patient clinic.

Friday

Hospital for Deformities and Joint Diseases — 8:30 and 2 to 3, out-patient clinic.
New York Orthopedic Hospital — 9, operations; 1:30, out-patient clinic.
Clinic for Functional Re-Education of Disabled Soldiers and Sailors — 10 to 4, out-patient clinic.
Hospital for Ruptured and Crippled — 1 to 3, out-patient clinic.
Bellevue Hospital — 3, out-patient clinic.
St. Luke's Hospital — 3:30, operations.

PATHOLOGY

J. R. LOSEE — Lying-in Hospital — Daily, 9 to 5. Museum specimens of obstetrical and prenatal pathology.
DR. STRONG — Woman's Hospital — Daily. Pathological specimens.
D. SYMMERS and A. V. ST. GEORGE — Bellevue Hospital — Thursday, 11. Anatomical and histological preparation of surgical specimens.
J. E. MCWHORTER — Bellevue Hospital — Monday, 11. Experimental observations on the healing of wounds, with lantern demonstration.
S. S. DIXON — New York Eye and Ear Infirmary — Monday and Wednesday, 10. Exhibition of macroscopical eye specimens.

OPHTHALMOLOGY

Monday

DR. DIXON — New York Eye and Ear Hospital — 11. X-ray localization for foreign body in eye and orbit.
DR. REESE — New York Eye and Ear Hospital — 2. Ptosis, modified Machek. Resection for convergent and divergent strabismus. Extirpation lacrymal sac. Cataract extraction, LaGrange operation.
DR. SHANNON — Manhattan Eye and Ear Hospital — 2. Elliot trephining, cataract extraction (combined).
DR. CASSELL — Manhattan Eye and Ear Hospital — 2. Cataract extraction, Kalt suture. Iridectomy.
DR. ALGER — Post Graduate Hospital — 2. Cataract extraction. Advancement operation.

Tuesday

DR. BELL — New York Eye and Ear Hospital — 2. Cataract extraction. Modified LaGrange for glaucoma.
DR. E. THOMSON — Manhattan Eye and Ear Hospital — 2. Cataract extraction. Trephine for retinal detachment.
DR. KNAPP — Knapp Memorial Eye Hospital — 2. Intracapsular cataract extractions and operative clinic.
DR. SHEPHARD — New York Ophthalmic Hospital — 10. Stereoscopic exercises and training in binocular vision.
DR. HEALY — New York Ophthalmic Hospital — 11. Ophthalmoscopic clinic.
DR. MCLANE — New York Ophthalmic Hospital — 2. Monometric readings with aid of McLane's tonometer in human eyes.
DR. M. COHEN — Post Graduate Hospital — 2. Heisrath-Kuhnt operation for trachoma. Extirpation lacrymal sac.
DR. CUTLER — St. Luke's Hospital — 2. Ophthalmoscopic clinic.
DR. NOGUCHI — Rockefeller Institute — 11. Demonstration of specimens of bacteria in conjunctival diseases.

Wednesday

DR. DIXON — New York Eye and Ear Hospital — 11. X-ray localization of foreign body in eye and orbit. Exhibition of pathological eye specimens.
DR. LAMBERT — New York Eye and Ear Hospital — 2. Operation for congenital dislocation of lens and needling for high myopia.
DR. HELFRICH — New York Ophthalmic Hospital — 11. Ophthalmoscopic clinic.
DR. LLOYD — New York Ophthalmic Hospital — 11. Demonstration with lantern slides of campimeter. Cataract extraction, Smith method, intracapsular.
DR. HALLETT — New York Ophthalmic Hospital — 2. Intracapsular cataract extraction.
DR. DAVIS — Post Graduate Hospital — 2. Cataract extraction. Advancement operation.
DR. WIENER — St. Luke's Hospital — 2. Dacryo-cystorhinostomy, external method.
DR. KOLLER — Mt. Sinai Hospital — 2. Cataract extraction. Hotz's operation for glaucoma.

Thursday

DR. WEEKS — New York Eye and Ear Hospital — 2. Cataract extraction (La Grange). Lid plastic.
DR. WHEELER — New York Eye and Ear Hospital — 2. Cataract extraction. Extirpation of lacrymal sac.
DR. THOMSON — Manhattan Eye and Ear Hospital — 2. Cataract extraction. Elliot trephining.
DR. VAN FLEET — Manhattan Eye and Ear Hospital — 2. Cataract extraction. Advancement.
DR. KENNY — Manhattan Eye and Ear Hospital — 2. Cataract extraction.
DR. TYSON — Knapp Memorial Eye Hospital — 2. Cataract extraction. Ophthalmological clinic.
DR. TOROK — Knapp Memorial Eye Hospital — 2. Intracapsular cataract extraction. Lacrymal sac. Muller's operation for retinal detachment.
DR. TRONCOSO — Post Graduate Hospital — 2. Ophthalmological clinic.
DR. MEDING — Harlem Eye and Ear Hospital — 2. Intracapsular cataract extraction, Smith method. Elliot trephining for glaucoma.

Friday

DR. CALLAN — New York Eye and Ear Hospital — 2. Capsular cataract (DeWecker). Elliot trephining. Motais operation for ptosis.

DR. LAMBERT — New York Eye and Ear Hospital — 2. Ophthalmological clinic.

DR. MITTENDORF — Manhattan Eye and Ear Hospital — 2. Cataract extraction, Homer Smith method. Advancement. Enucleation with fat transplantation.

DR. HARE — Manhattan Eye and Ear Hospital — 2. Graduate tenotomy.

DR. WOOTTON — Manhattan Eye and Ear Hospital — 2. Ophthalmological clinic.

DR. MEEKER — Post Graduate Hospital — 2. Demonstration of pathological eye specimens.

DR. MAY — Bellevue Hospital — 2. Cataract extraction. Advancement, Lancaster method.

DR. WOLFF — Bellevue Hospital — 2. Enucleation with fat transplantation. Hotz operation for glaucoma.

LARYNGOLOGY

Monday

L. A. COFFIN — Manhattan Eye, Ear, and Throat Hospital — 2:30. Intranasal exenteration of ethmoidal cells with simultaneous cadaver demonstration.

A. M. ANDERSON — Polyclinic Hospital — 2. Frontal sinus and antral operation, intranasal; radiographic plates, demonstrating results after operation.

E. L. PRATT — Bellevue Hospital — 2. Submucous nasal resection. Exhibition of cases.

JOHN MCCOY — University and Bellevue Hospital Medical School — 2. Tonsillectomy and submucous nasal resection.

L. M. HURD — New York Throat and Nose Hospital — 2:30. Tonsillectomy and submucous resection.

JOHN LESHURE — Vanderbilt Clinic — 2. Tonsillectomy.

Tuesday

H. L. LYNAH — Willard Parker Hospital — 9. Demonstration of direct intubation and extubation. Laryngeal cauterization for chronic stenosis of larynx. Bronchoscopy for removal of diphtheritic foreign body obstruction.

JOHN E. MACKENTY — Manhattan Eye, Ear, and Throat Hospital — 11. Laryngectomy.

E. R. FAULKER — Manhattan Eye, Ear, and Throat Hospital — 9:30. Intranasal exenteration of ethmoidal cells under general anæsthesia.

J. J. KING — New York Eye and Ear Infirmary — 9:30. Tonsillectomy.

JOHN M. HALL — New York Eye and Ear Infirmary — 9:30. Tonsillectomy, cocaine anæsthesia.

L. M. HURD — Bellevue Hospital — 11. Intranasal operations on the nasal accessory sinuses.

J. D. KERNAN, JR.— Bellevue Hospital — 2:30. Nasal operations under local anæsthesia. Exhibition of cases.

J. E. MACKENTY — Manhattan Eye, Ear, and Throat Hospital — 3. Bone transplantation for nasal deformity.

J. H. ABRAHAM— Polyclinic Hospital — 2. Demonstration of nasal accessory sinus cases, with radiographic plates.

E. L. PRATT — Vanderbilt Clinic — 2. Tonsillectomy.

ARTHUR J. HUEY — University and Bellevue Hospital Medical College — 2. Submucous nasal resection.

Wednesday

H. L. LYNAH — Polyclinic Hospital — 9. Demonstration of direct laryngoscopy and œsophagoscopy.

LEWIS A. COFFIN — Manhattan Eye, Ear, and Throat Hospital — 11. Operation for relief of ozena and presentation of cases.

N. R. DANN — New York Eye and Ear Infirmary — 9:30. Radical accessory nasal sinus operations.

C. G. COAKLEY — Bellevue Hospital — 2:30. External nasal accessory sinus operation.

J. D. KERNAN, JR.— Manhattan Eye, Ear, and Throat Hospital — 2. Operation for nasal deformity.

O. L. MONROE — Manhattan Eye, Ear, and Throat Hospital — 2. Tonsillectomy, local anæsthesia.

W. W. GRIFFIN — Manhattan Eye, Ear, and Throat Hospital — 2. Submucous nasal resection.

DRS. A. P. VOISLAWSKY, L. T. PERRAULT, and W. M. HUNT — St. Luke's Hospital — 2. Tonsillectomy, St. Luke's method, general and local anæsthesia, in cardiac and rheumatic patients in whom tonsil is focus of infection.

D. B. DELEVAN — St. Luke's Hospital — 2. Laryngectomy; end-results. Use of Dichloramine-T. Chlorcosane solution as used for disinfection of "carriers."

H. L. LYNAH — Polyclinic Hospital — 2. Bronchoscopy for thymic tracheal stenosis.

H. L. GATEWOOD — Polyclinic Hospital — 2:30. Tonsillectomy; new method of local anæsthesia.

M. D. LEDERMAN — Polyclinic Hospital — 3:30. Demonstration and treatment of lingual tonsil.

Thursday

H. L. LYNAH — Willard Parker Hospital — 9. Demonstration of direct laryngoscopy, bronchoscopy, and œsophagoscopy; direct and digital method of intubation. Trachelotomy cases.

JOHN MCCOY — New York Eye and Ear Infirmary — 9:30. Laryngeal and nasal accessory sinus operations.

D. S. DOUGHERTY — Polyclinic Hospital — 10. Suspension laryngoscopy.

J. D. KERNAN, JR.— Bellevue Hospital — 2:30. Laryngostomy, tracheal stenosis. Suspension laryngoscopy.

J. E. MACKENTY — Manhattan Eye, Ear, and Throat Hospital — 2. Cleft palate operation.

J. A. MULHOLLAND — Manhattan Eye, Ear, and Throat Hospital — 2. Intranasal operation, nasal accessory sinuses.

WILLIAM M. DUNNING — Manhattan Eye, Ear, and Throat Hospital — 3. Submucous resection of nasal septum.

A. M. ANDERSON — Polyclinic Hospital — 2. Exhibition of sinus cases.

Friday

E. V. HUBBARD — Manhattan Eye, Ear, and Throat Hospital — 11. Partial thyroidectomy (for goiter) with transplantation of remaining tube.

T. L. SAUNDERS — New York Eye and Ear Infirmary — 9:30. Radical nasal accessory sinus operation.

L. D. ALEXANDER — New York Eye and Ear Infirmary — 9:30. Intranasal antrum operation, cocaine anæsthesia.

L. M. HURD — Bellevue Hospital — 2:30. External accessory nasal sinus operation.

J. H. ABRAHAM — Polyclinic Hospital — 2. Tonsillectomy and method of ligation.

HARMON SMITH — Manhattan Eye, Ear, and Throat Hospital — 2. Tonsillectomy (Sluder).

I. W. VOORHEES — Manhattan Eye, Ear, and Throat Hospital — 2. Demonstration of the use of Dichloramine-T in infection of respiratory tract.

LEWIS A. COFFIN — Manhattan Eye, Ear, and Throat Hospital — 2:30. Nasal accessory sinus operations.

OTOLOGY

Monday

W. C. BOWERS — Bellevue Hospital — 2:30. Radical mastoid with skin grafting.

DR. KERRISON — Manhattan Eye, Ear and Throat Hospital — 2. Operative clinic.

DR. RICHARDS — Manhattan Eye, Ear and Throat Hospital — 3. Operative clinic.

DR. DWYER — Manhattan Eye, Ear and Throat Hospital — 2. Laboratory demonstration.

DRS. DENCH, PERKINS, ROBINSON and SCUTTER — New York Eye and Ear Infirmary — 2:30. Operations and demonstration of cases.

DR. SCHOOMAKER — Post Graduate Hospital — 2:30. Mastoid.

Tuesday

T. L. SAUNDERS — Bellevue Hospital — 2:30. Acute mastoid operation.

DR. PIKE — Manhattan Eye, Ear and Throat Hospital — 10. Experimental demonstration: Effect of certain lesions of the central nervous system on nystagmus.

DR. PHILLIPS — Manhattan Eye, Ear and Throat Hospital — 2. Operative clinic.

DR. SHARP — Manhattan Eye, Ear and Throat Hospital — 3. Operative clinic.

DR. LAW — Manhattan Eye, Ear and Throat Hospital — 3. Demonstration of cases.

DRS. DENCH, PERKINS, ROBINSON and SCUTTER — New York Eye and Ear Infirmary — 10:30. Operations and demonstrations.

DR. DIXON — New York Eye and Ear Infirmary — 10:30. Demonstration: Radiographs of mastoid cases.

DRS. BACON, SUTPHEN, and HALL — New York Eye and Ear Infirmary — 2:30. Operations and demonstrations of cases.

DR. MCFARLAND — Post Graduate Hospital — 2:30. Radical mastoid operation.

Wednesday

DR. SMITH — Polyclinic Hospital — 10. Demonstration on cadaver of radical and labyrinth operations.

DR. STEVENS — Polyclinic Hospital — 2. Radical operation.

DRS. FRIESNER and STRAUS — Manhattan Eye, Ear, and Throat Hospital — 10. Demonstration of neurological cases showing abnormalities of nystagmus.

DR. KERRISON — Manhattan Eye, Ear and Throat Hospital — 2. Operative clinic.

DR. PHILLIPS — Manhattan Eye, Ear and Throat Hospital — 3. Cinematographic demonstration of mastoid operation.

DR. WHITING — New York Eye and Ear Infirmary — 2:30. Operations and demonstrations.

DRS. LEWIS, BLACKWELL, FERGUSON, and KING — New York Eye and Ear Infirmary — 2:30. Operations and demonstrations.

DR. FARR — Post Graduate Hospital — 2:30. Mastoid operation.

Thursday

DR. DENCH — St. Luke's Hospital — 2:30. Radical operation for chronic middle ear suppuration.

DR. BOWERS — St. Luke's Hospital — 2:30. Complete mastoid operation.

DR. PERKINS — St. Luke's Hospital — 10. Ward demonstration.

DR. DWYER — Manhattan Eye, Ear and Throat Hospital — 10. Laboratory demonstration.

DR. BRAUN — Manhattan Eye, Ear and Throat Hospital — 2. Operative clinic.

DRS. DWYER and FRIESNER — Manhattan Eye, Ear and Throat Hospital — 3:30. Demonstration: Radical mastoid operation on cadaver.

DRS. LEWIS, BLACKWELL, FERGUSON, and KING — New York Eye and Ear Infirmary — 10:30. Otorhinological clinic.

DR. DIXON — New York Eye and Ear Infirmary — 10:30. Demonstration: Radiographs of the mastoid.

DR. MCCOY — New York Eye and Ear Infirmary — 2:30. Operations and demonstrations.

DR. O'CONNELL — Post Graduate Hospital — 2:30. Radical mastoid operation.

Friday

DR. DAVIS — Polyclinic Hospital — 10. Demonstration of labyrinth tests.

DR. SMITH — Polyclinic Hospital — 2. Demonstration of ten postoperative mastoid (radical) cases.

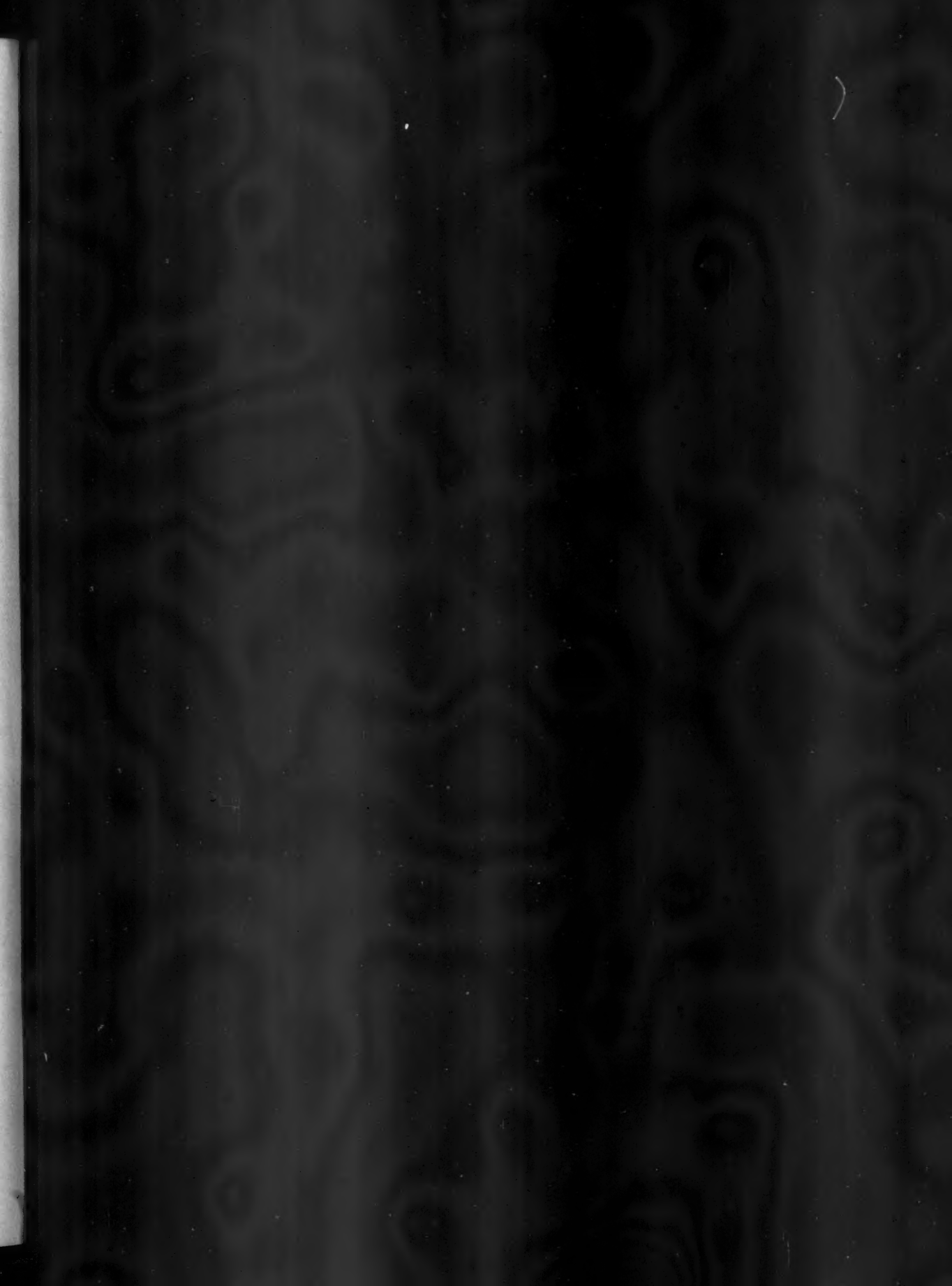
DR. HURD — Bellevue Hospital — 2:30.

DR. LAW — Manhattan Eye, Ear, and Throat Hospital — 10. Lantern slide demonstration of X-rays of mastoid and sinus.

DR. MCFARLAND — Manhattan Eye, Ear, and Throat Hospital — 2. Operative clinic.

DR. PAGE — Manhattan Eye, Ear, and Throat Hospital — 3:30. Operative clinic.

DRS. SAUNDERS and A. U. CALLISEN — New York Eye and Ear Infirmary — 2:30. Operations and demonstrations.

DR. SMITH — Post Graduate Hospital — 2:30. Mastoid demonstration.

DR. BROWN — Post Graduate Hospital — 3:30. Cochlear and vestibular tests in connection with malingering.